Pit and Quarry

With which is consolidated

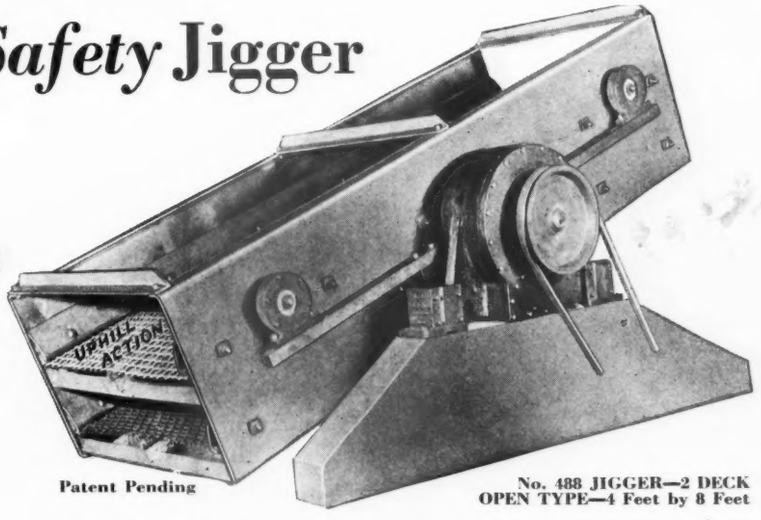
CEMENT-MILL & QUARRY

April, 1933

Rochester Public Library
5 Court St

The Heavy Duty *Safety* Jigger

Close Grading
Vibrators Completely Enclosed
Oil Lubrication
Full Floating Drive Shaft
Low Price
Low Power
Self Lubricating
Controlled Vibration
Rugged Construction
Quick Cloth Change
Safety
Large Capacity

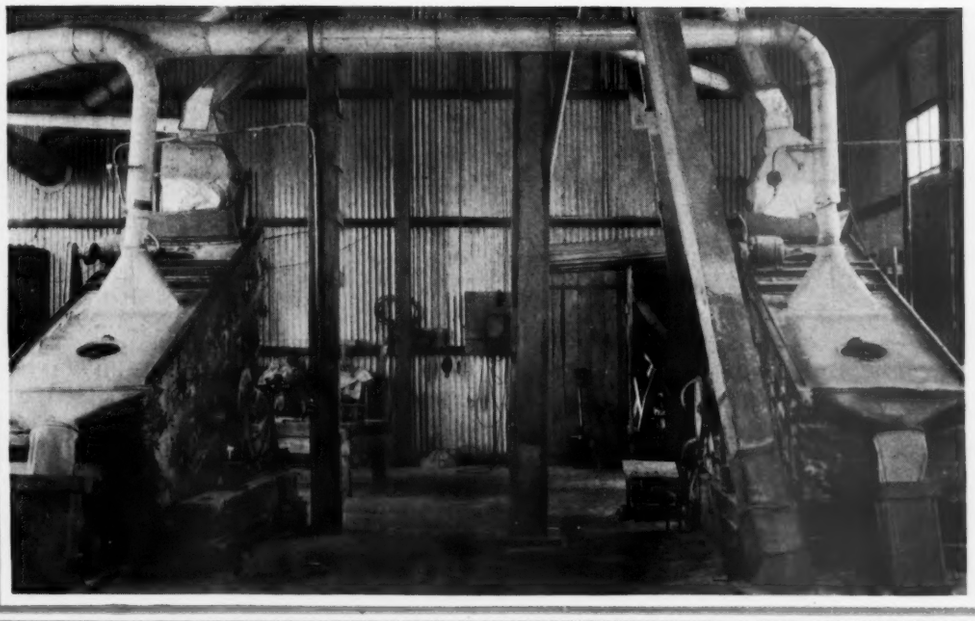


Patent Pending

No. 488 JIGGER—2 DECK OPEN TYPE—4 Feet by 8 Feet

The **Heavy Duty** *Safety* Jigger is a positive eccentric vibrating screen with a "circle throw" vibration, controlled to suit the material — giving an accurate economical separation on any grade or type of material, never before possible. 40% less horsepower. It will pay you to send for Bulletin 133 for more complete information.

PRODUCTIVE EQUIPMENT CORP.
7536 S. Claremont Ave. **CHICAGO, ILL.**



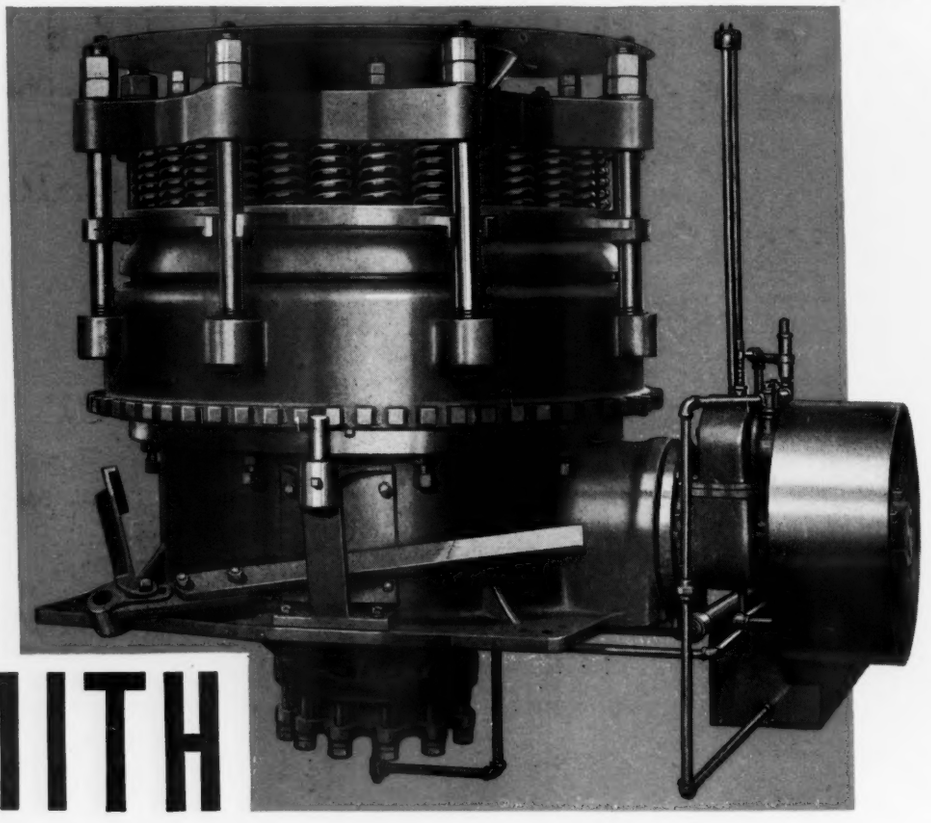
Two of the five Jigger screens installed by the Wedron Silica Company, Wedron, Illinois. All completely enclosed, eliminating dust and equipped with automatic cleaner to prevent clogging and give complete uniform grading.

Pages 13-17

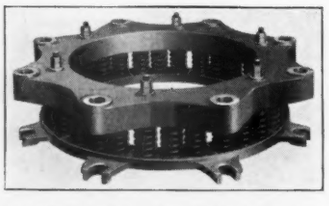
AN INNOVATION IN SECONDARY CRUSHING

NEW

- **design**
- **efficiency**
- **value**



THE TELSMITH Gyrasphere



- Manganese steel crushing members wear evenly and maintain spherical shape throughout their life.
- Main frame, adjusting collar and concave bowl (entire outer structure) are steel, guaranteed for two years against breakage, even by tramp iron.
- Head is supported on eccentric with roller bearing between. Rotation of head support assures permanent alignment of shaft and eccentric.
- Bronze eccentric bearings — automatic lubrication.
- Roller bearing countershaft unit.
- Simple, fast adjustment with wide range of products.
- Spring assembly is a self-contained unit, protected by feed hopper, easily removable by loosening nuts on a few large tension bolts. Crusher may be dismantled without loosening any other bolts.

Telsmith announces another important development in secondary crushing practice—a spring relief crusher with spherical head, roller thrust bearings and choke feed. The Telsmith Gyrasphere asks and expects no quarter from the operator. Pile up the rock in the feed hopper—this machine will take a *free gravity flow*—as it comes. *Power consumption is reduced* and peak loads are flattened out—due to the fact that all vertical thrust (constituting over half of the load) is taken on anti-friction thrust bearings. The spherical head requires the rock to travel on an arc-shaped course, multiplying the number of pinches and insuring a *more uniform product* containing fewer slabs or splinters.

SMITH ENGINEERING WORKS
504 East Capitol Drive, Milwaukee, Wisconsin

Canadian Representatives: Canadian Ingersoll-Rand Co. Ltd., Montreal, P. Q.

355 Walton Ave. New York City	211 W. Wacker Drive Chicago, Ill.	Harrison Bldg. Philadelphia, Pa.	1109 Statler Bldg. Boston, Mass.
The K. B. Noble Co. Hartford, Conn.	Clark & Freeland, Inc. Baltimore, Md.	607 Westinghouse Bldg. Pittsburgh, Pa.	928 Williamson Bldg. Cleveland, Ohio
Milburn Machy Co. Columbus, Ohio	Borchert-Ingersoll, Inc. St. Paul, Minn.	Brandeis M & S Co. Louisville, Ky.	Choctaw C & M Co. Memphis, Tenn.

YC-1

WRITE FOR BULLETIN Y-15

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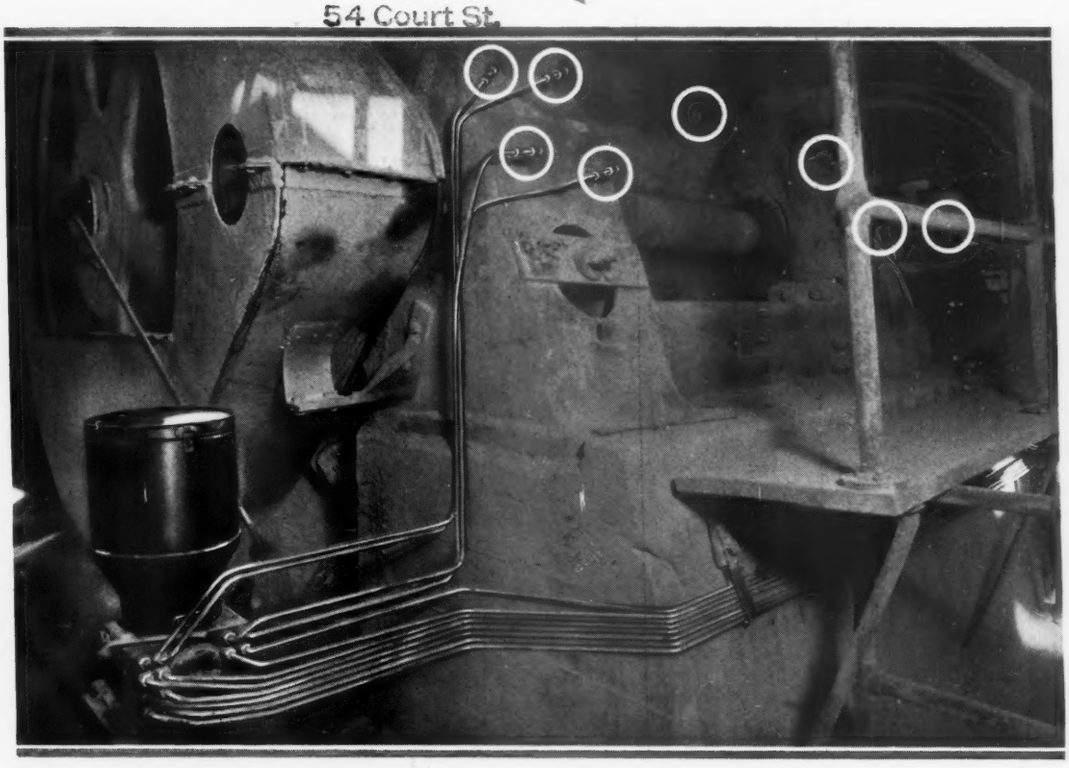

The large bearings of this Fairmount Crusher are lubricated economically and dependably with a Bosch Automatic Forced Feed Lubricator, type KP-30

ourrent

NEW WAY to LUBRICATE Cement Mill Machinery

EVERY cement mill operator knows the *need* for correct lubrication. Now at last Bosch offers a lubricating system that will work dependably under all conditions. However inaccessible the bearings; however heavy the loads; whatever the heat or the high resistance pressures, the Bosch Automatic Forced Feed Grease Lubricator provides sure protection for your machinery.

The operation of the Bosch Lubricator is entirely and fully automatic, positive, and mechanical. It requires neither air pressure nor any other auxiliary. It can be driven by the machinery it lubricates.

The instant the machinery turns over, lubrication starts. The instant the machinery stops, lubrication automatically stops. During operation, it gives a constant flow of lubricant against resistance pressure and regulated by the speed of the machine.

Such dependable lubrication means positive reduction in your maintenance costs. First and foremost it protects your machinery as never before against breakdowns and repairs caused by faulty lubrication, effecting economies which in themselves soon pay for the Lubricator many times over. With the Bosch Lubricator, substantial savings in grease are apparent from the start. With the Bosch Lubricator, there is also a tangible economy in power consumption.

The same high standard that characterizes *all* Bosch Products extends to the Bosch Lubricator —it is ruggedly built for years of attention-free service! Let us show you how the Bosch Automatic Lubricator can be applied to your equipment. Send for specific folder with blue prints, charts, diagrams and full technical information.

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AUTOMATIC FORCED FEED
LUBRICATION

Pit and Quarry

With which is consolidated
CEMENT-MILL & QUARRY

Volume 25 April, 1933 Number 8

MEMBER AUDIT BUREAU OF CIRCULATIONS

Published on the first of each month for producers and manufacturers of Cement, Crushed Stone, Gypsum, Lime, Sand, Gravel and other nonmetallic minerals. Entered as second-class matter November 28, 1932, at the Postoffice at Chicago, Ill., under the Act of March 3, 1879.

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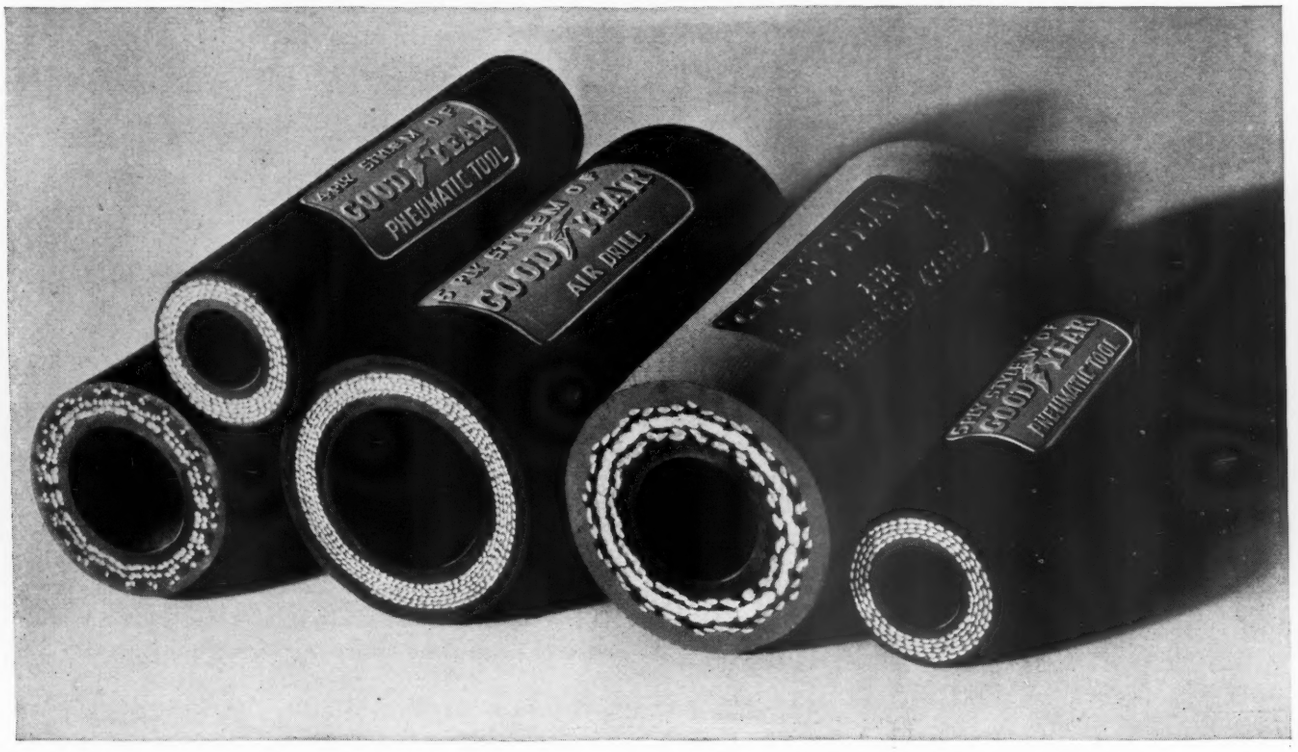
SHOW US YOUR JOB



WE'LL SHOW YOU THE HOSE

THE right hose, specially built to handle your job, is in the Goodyear line of quality hose. Why not let us help you choose it?

Emerald Cord Air Hose is a super air hose, designed for the severest operating conditions.

Style M Air Drill Hose handles heavy air drill service perfectly.

Style M Pneumatic Tool Hose is recommended for heavy pneumatic tool service.

Style W Pneumatic Tool Hose is for pneumatic tool service where working conditions are not extremely severe.

Wingfoot Air Hose is the highest type molded braided air hose construction.

Every Goodyear Hose has its own particular balanced construction, scientifically right because based on thoroughgoing experience with actual operating conditions in your industry, and accurately specified to its duty by the G. T. M. — Goodyear Technical Man.

Goodyear Hose is cost-reducing hose. Let the G. T. M. show you how and where you can get more and better hose service for your money from the right style and type of Goodyear Hose. You can get in touch with him by writing to Goodyear, Akron, Ohio, or Los Angeles, California, or by calling your nearest Goodyear Mechanical Rubber Goods Distributor.

Other G.T.M.-Specified Goodyear Products For Sand and Gravel, Rock and Cement Industries

- Sand Suction Hose
- Dredging Sleeves
- Conveyor Belts
- Transmission Belts
- Elevator Belts

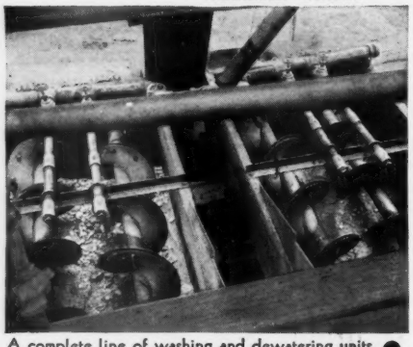
THE GREATEST NAME IN RUBBER

GOODYEAR

BELTS • MOLDED GOODS • HOSE • PACKING

Keep Your Plant

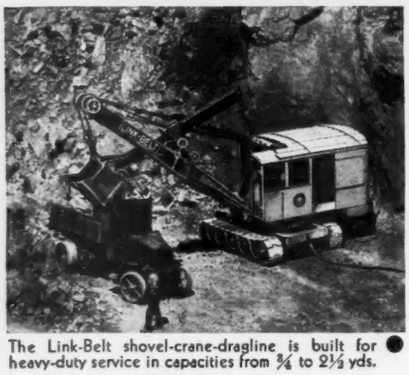
The Link-Belt Vibrating Screen, "A Triumph of Mechanical Vibration"



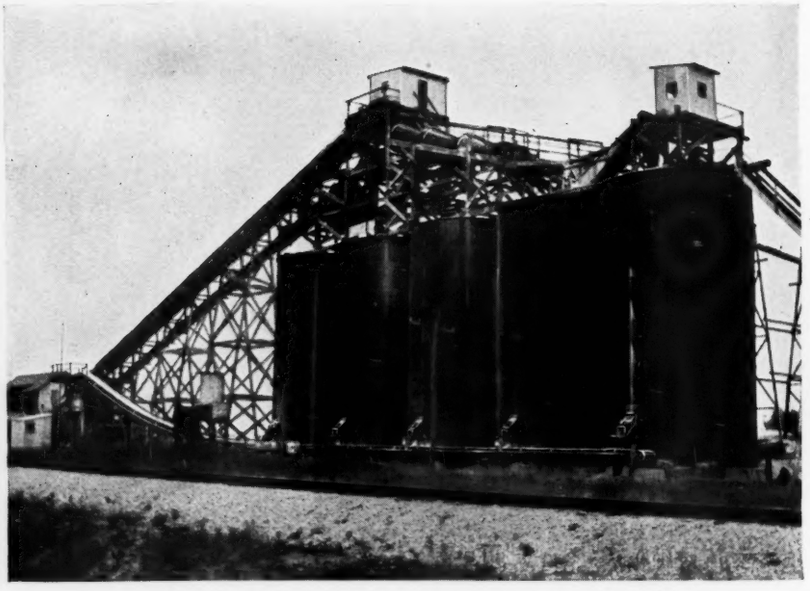
A complete line of washing and dewatering units of the log, screw, flight, screen and scrubber types

The "Grizzly" crawler loader. A real "one man" machine

Steel apron feeder for aggregates. Part of Link-Belt elevating and conveying equipment at mixing plant of Ready Mixed Concrete Corporation

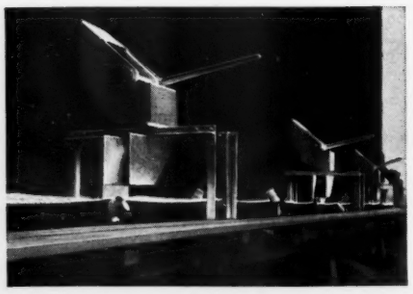


The Link-Belt shovel-crane-dragline is built for heavy-duty service in capacities from ¾ to 2½ yds.



Michigan Gravel Company's modern plant located at Saginaw, Mich.

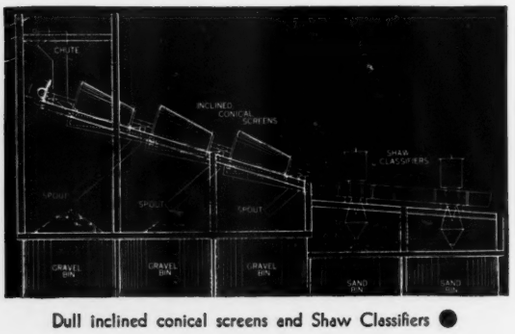
A GOOD example of keeping pace with progress in equipment and methods, is presented by the Michigan Gravel Company, of Saginaw. Their original plant, built in 1911 by Link-Belt, was steam engine driven, through rope drives to belt conveyors and horizontal conical screens.



Mixing belt conveyor, with gates to control different sizes, Michigan Gravel Company

The plant was electrified later on, and Dull inclined conical screens replaced the original horizontal screens.

More recent changes — the adoption of steel bins, lengthening of belt conveyor, and other additions, have brought this plant up to a higher state of efficiency, resulting in increased capacity and lower production costs.



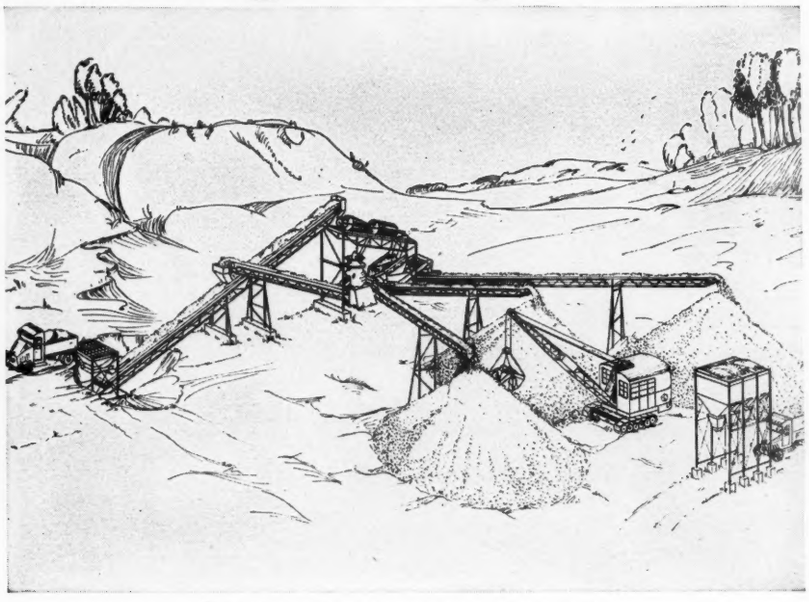
Dull inclined conical screens and Shaw Classifiers

LINK-BELT COMPANY
CHICAGO
300 W. PERSHING RD.
INDIANAPOLIS
SAN FRANCISCO
PHILADELPHIA
TORONTO
Offices in All Principal Cities

4701

LINK-BELT

in "Fighting Trim"

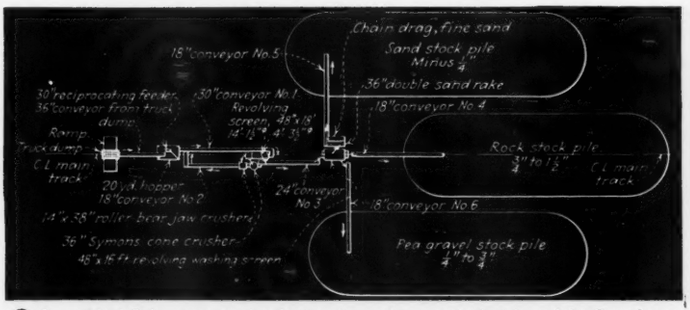


● Link-Belt semi-portable sand and gravel washing plant

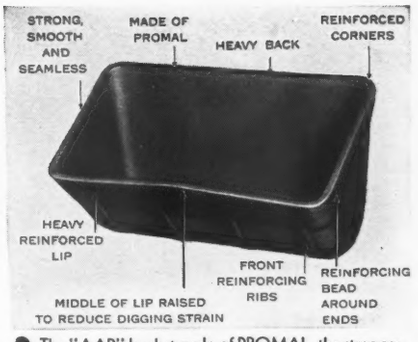
TO supplement your permanent plant equipment, or for use in locations where permanent plants are not available, this Link-Belt arrangement offers a semi-portable, dependable plant, with a capacity of from 75 to 125 tons per hour.

It consists of standard Link-Belt units—belt conveyors, drives, screens, scrubbers, and dewatering screw conveyors—as in standard plant construction. The structure is built in convenient lengths so that it can be unbolted and readily transported. These units are strong, rugged, and of sufficient capacity, to assure continuous operation, with a minimum of upkeep expense.

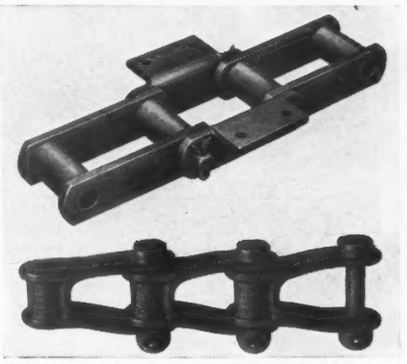
● An arrangement for eliminating excess sand at the pit, before material goes to the main plant. Mounted on railway trucks


Chain drag, fine sand
Sand stock pile
Minus 4"
18" conveyor No. 5
36" double sand rake
30" reciprocating feeder, 36" conveyor from truck dump
30" conveyor No. 1
Revolving screen, 48" x 18"
18" conveyor No. 4
Ramp
Truck dump
C L main track
20 yd. hopper
18" conveyor No. 2
Rock stock pile
3" to 1½"
C L main track
24" conveyor No. 3
18" conveyor No. 6
14" x 28" roller bear. jaw crusher
36" Symons cone crusher
48" x 16 Ft. revolving washing screen
Pea gravel stock pile
¼" to ¾"

● Special Link-Belt aggregate plant built to fit conditions in the building of the Coast Range tunnel for Hetch Hetchy water supply project, San Francisco



● The "AAP" bucket made of PROMAL, the stronger, longer-wearing metal



● Chains of all types and sizes, made of Promal, malleable iron or steel

● Link-Belt anti-friction belt conveyor idlers. A type for every service

● 20,000 sprockets always in stock for immediate shipment

● Link-Belt car spotter. A time and money saver for moving railroad cars quickly

WASHING, SCREENING, HANDLING EQUIPMENT

AMERCLAD
ALL-RUBBER
CABLES

Ready to "Rough It" For You

Greater tensile strength—elimination of kinking—that's what American Steel & Wire Company Amerclad All-Rubber Cables offer you in addition to greatly increased life due to high resistance to abrasions and to the action of acids, oils and greases.

Remember—for many uses in connection with the operation of electric shovels and locomotives—Amerclad. For loading machines and welding machines—Amerclad. For mining machines and drills—Amerclad.

Write us for samples of Amerclad All-Rubber Cables.

1831 MORE THAN 100 YEARS of PROGRESS IN WIRE MAKING 1933

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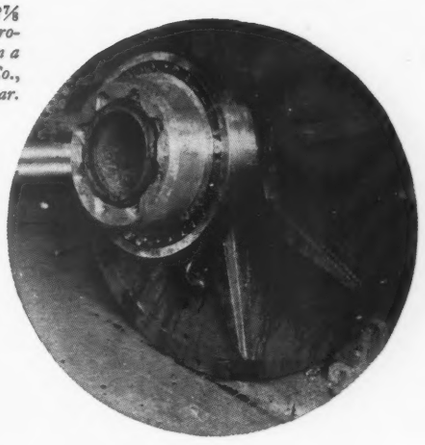
● *One of a pair of SKF Spherical Bearings, 33⅞ inches in diameter...among the largest ever produced . . . after 9 years under a 50 ton load on a cement mill of the Dexter Portland Cement Co., Nazareth, Pa. No appreciable signs of wear.*



UNDER A 50 TON LOAD *for* 9 *Years*...

. . . no signs of quitting yet!

Whether it's as big as a barrel or as small as a dime an SKF Bearing invariably outperforms even the fondest expectations of the engineer who specifies it.

That is an SKF tradition, backed by PLUS-PERFORMANCE records in every industry.

Take the situation pictured above. Cement mill operation offers no swivel chair sinecure for any bearing. A tough, gruelling job . . . abrasive-filled atmosphere . . . crushing, grinding, pulverizing . . . a staggering, constantly varying load. Yet, the pair of SKF Bearings in the mill illustrated above has been doing that sort of job for 9 years . . . and without showing any appreciable signs of wear.

You can get SKF PLUS-PERFORMANCE simply by insisting upon SKF. You *should* get it. It *costs* less.

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A promise is ONLY a promise . . . Performance is History

SKF

3003 **BALL AND ROLLER BEARINGS**

Showing how each Cordeau-Detonated hole is connected with other holes across the floor of the blast.

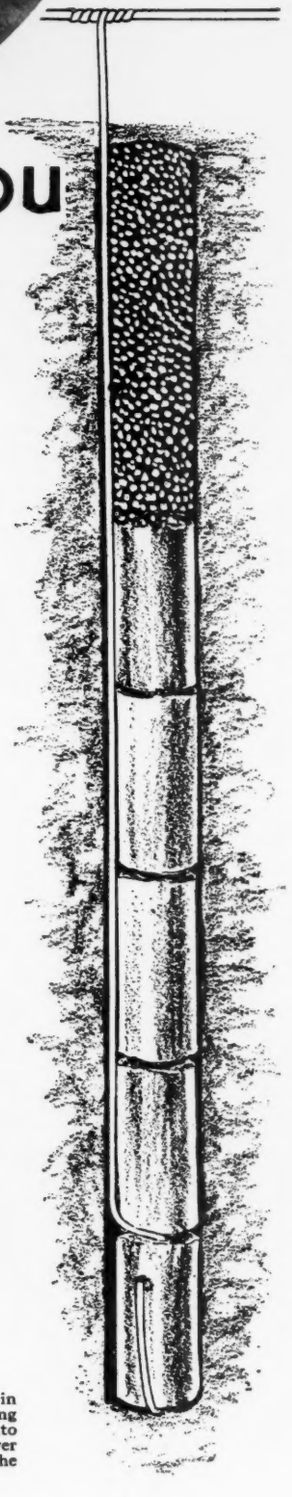
Each cartridge is a *primer cartridge* when you detonate with Cordeau

Explosive engineers agree that the explosion is strongest in the primer cartridge.

With Cordeau-Bickford Detonating Fuse you can secure this increased "work" from each cartridge in the hole. A line of Cordeau, extending from the top to the bottom of the charge, insures the complete and simultaneous detonation of each cartridge. Thus each cartridge is, in effect, a primer cartridge when you detonate with Cordeau.

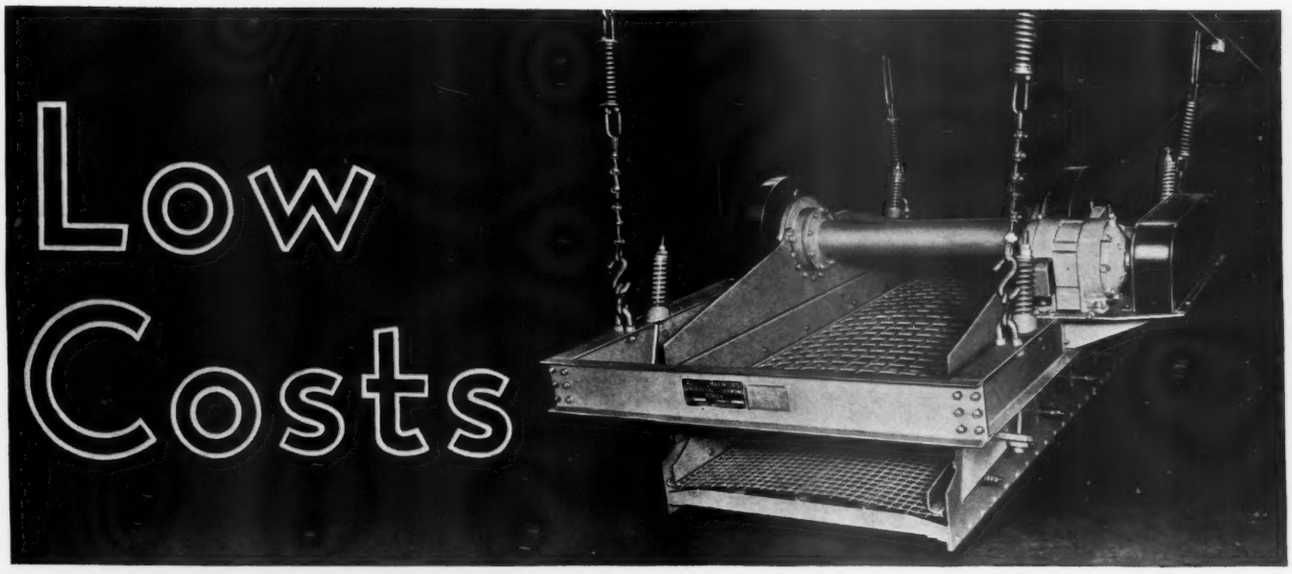
Add to this the advantages of simplified loading, deep hole or giant blasting, lower hazard, and better fragmentation, and you find plenty of justification for the *general* use of Cordeau-Bickford.

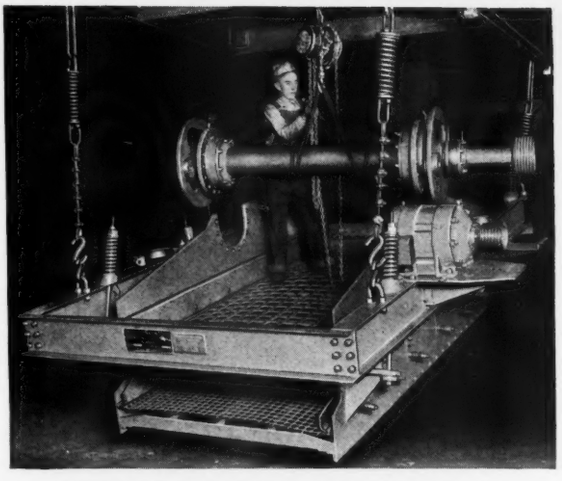
CORDEAU DETONATING FUSE BICKFORD



No detonating cap in the hole. Merely string the first cartridge onto the Cordeau and lower to the bottom of the hole.

The ENSIGN-BICKFORD COMPANY · SIMSBURY · CONN.





Driving Mechanism is convenient for inspection and is easily removed or replaced

Screen Sections are easily and quickly changed. Liberal clearance between decks facilitates spouting

With New Style B Vibrating Screens

Style B screens are of heavy construction with positive eccentric motion. They are especially suitable for heavy loads and are built in a large range of sizes. . . . The driving mechanism is above the screen convenient for inspection and lubrication. It can be easily removed or replaced. The screen body floats on balance springs reducing power requirements and the load on the bearings. The liberal clearance between decks facilitates spouting, inspection of cloth and changing of screen sections. Screen cloth is held in tension and is reversible. All bearings are of the anti-friction type enclosed in dust-proof housings. All revolving parts are enclosed, protecting workmen and reducing installation expense necessary to meet safety laws. Mechanisms can be rotated in either direction. Screen motor and drive, all built by Allis-Chalmers, are tested as a unit at the factory before shipment. . . . The above features result in a screen of high capacity, uniform product, and low power and maintenance costs.

OTHER ALLIS-CHALMERS PRODUCTS

Gyratory Crushers
McCully and Newhouse
Non-Choking Concaves
Jaw and Roll Crushers
Revolving Screens
Vibrating Screens
Scrubbers and Washers
Elevators and Conveyors
Feeders and Bin Gates
Friction and Electric Hoists
Grinding Machinery
Cement Mill Machinery
Mining Machinery
Electric Motors
Gearmotor Units
Texrope V-Belt Drives
Centrifugal Pumps
Air Compressors
Track-type Tractors
Road Machinery
Track-type Wagons
Tunnel Shovels

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee

Thousands have found WILLIAMSPORT *More dependable*

From the smallest sizes to the largest wire rope used in America, Williamsport has proven its outstanding superiority in point of service.

Our engineers have perfected special wire ropes for drag line and quarry service that are establishing performance records far beyond our own expectations.

Write us today for specific facts about these new ropes.

You can hardly afford to do without them. They have reduced operating costs for others; why not for you too?

Announcing also the latest improvement in "Form Set," our Preformed wire rope.

Let us tell you more about it.

WILLIAMSPORT *Wire Rope*

PORT — CAST STEEL

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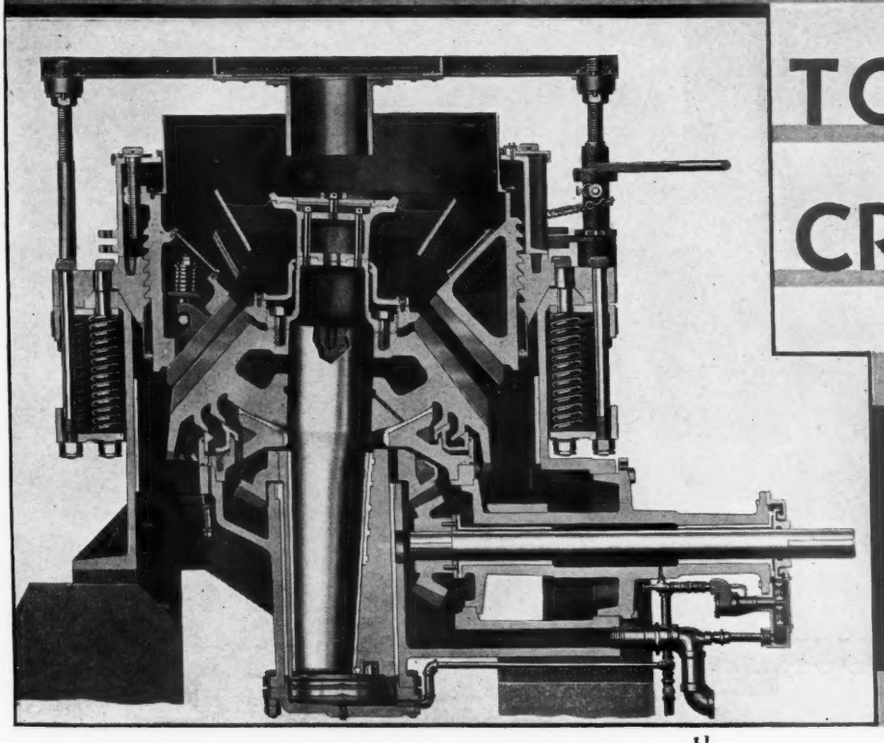
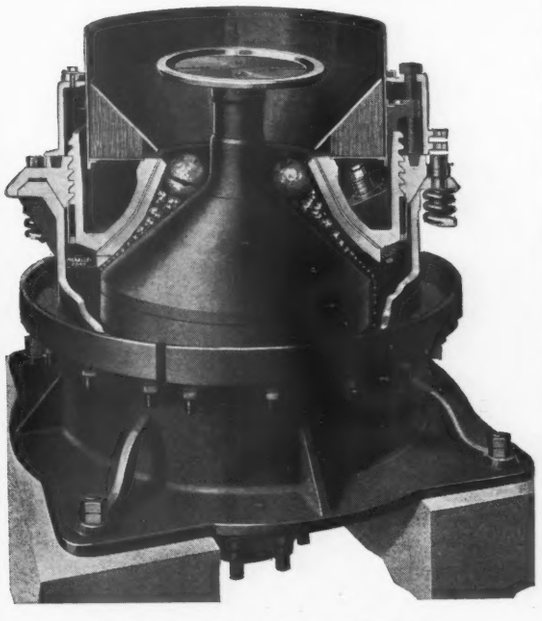
General Sales Offices: 122 So. Michigan Ave., CHICAGO

LEADING THE WAY TO FINER CRUSHING



The New Short Head Cone Crusher

AFTER more than a year of field trials in the extremely fine crushing of a variety of materials, Nordberg now offers a companion to the Standard Cone ... the New SHORT HEAD. This newer development is of especial interest to those confronted with the problem of crushing finer than has heretofore been possible with any single piece of crushing equipment. Producing a finer and better product in greater capacity permits of a substantial reduction in fine crushing costs. The Symons Cone continues to lead the way for those who wish to crush finer.



STANDARD CONE CRUSHER

For reduction crushing to the ordinary sizes, the Standard Cone Crusher stands without an equal.

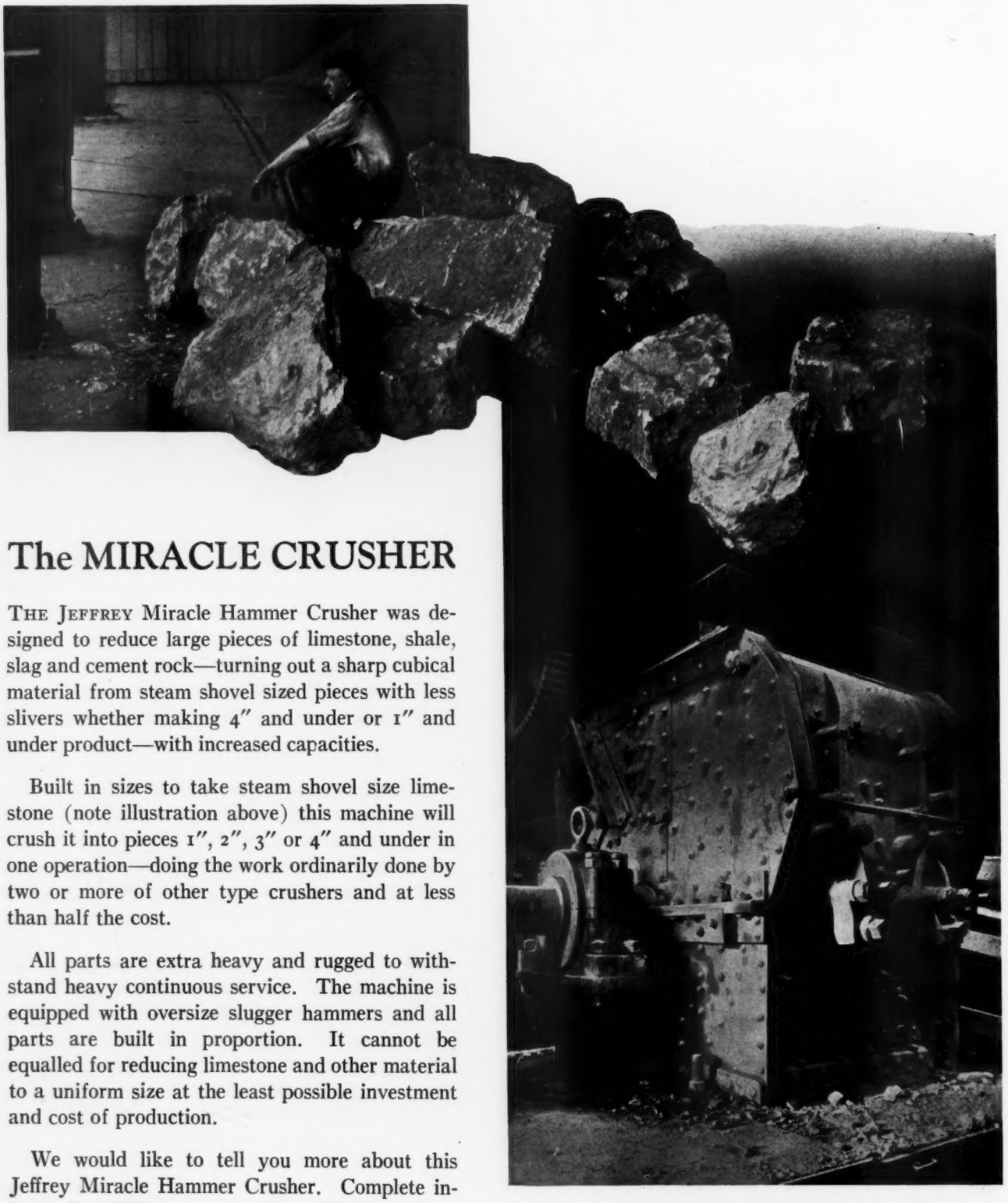
NORDBERG MFG. CO. MILWAUKEE, WISCONSIN

NEW YORK CITY
60 East 42nd St.

LONDON, W. C. 2
Bush House

LOS ANGELES, CALIF.
Subway Terminal Bldg.

FOR PRIMARY CRUSHING



The MIRACLE CRUSHER

THE JEFFREY Miracle Hammer Crusher was designed to reduce large pieces of limestone, shale, slag and cement rock—turning out a sharp cubical material from steam shovel sized pieces with less slivers whether making 4″ and under or 1″ and under product—with increased capacities.

Built in sizes to take steam shovel size limestone (note illustration above) this machine will crush it into pieces 1″, 2″, 3″ or 4″ and under in one operation—doing the work ordinarily done by two or more of other type crushers and at less than half the cost.

All parts are extra heavy and rugged to withstand heavy continuous service. The machine is equipped with oversize slugger hammers and all parts are built in proportion. It cannot be equalled for reducing limestone and other material to a uniform size at the least possible investment and cost of production.

We would like to tell you more about this Jeffrey Miracle Hammer Crusher. Complete information will be sent on request. Write today.

Note the large pieces of limestone in the illustration above. This gives you a good idea of the size this JEFFREY CRUSHER *is capable of handling. The lower view shows an installation of one of these big Crushers.*

The Jeffrey Manufacturing Company
917-99 North Fourth St., Columbus, Ohio

New York, Buffalo, Rochester, N. Y. — Philadelphia, Pittsburgh, Scranton, Pa. — Boston, Cincinnati, Cleveland — Detroit, Chicago, Milwaukee — St. Louis, Charleston, W. Va., Denver — Salt Lake City, Birmingham, Dallas

Jeffrey Manufacturing Company, Ltd., of Canada. Head Office & Works, Montreal—Branch Offices: Toronto—Calgary—Vancouver

VOLUME 25 NUMBER 8

Pit and Quarry
With which is consolidated
CEMENT-MILL & QUARRY
CHICAGO, APRIL, 1933

Supreme Court Holds Coal-Sale Plan Legal

OPENS WAY FOR OTHER TRADES

When the United States Supreme Court recently overruled the decision of a lower court to the effect that the Appalachian Coals, Inc., had been organized in violation of the Sherman Act and subsequent legislation governing business combinations, it created a new and radically-different conception of the restrictions imposed by the anti-trust laws. The evidence showed that Appalachian Coals, Inc., would control 11.96 per cent. of the bituminous coal mined east of the Mississippi River and that its plan contemplated the operation of companies mining 73 per cent. of the coal in the so-called Appalachian territory.

The plan of operation of this corporation was also exactly similar to what is known in the nonmetallic mineral industries as a sales company and concerning whose legality there has been some doubt. The decision of the Supreme Court sustains their legality insofar as interstate commerce is concerned, and while nonmetallic minerals industries are essentially intrastate in most cases, it is likely that the supreme courts of the various states will follow the United States Court in its more liberal interpretation of regulatory laws.

This decision is regarded as a real test of the anti-trust laws in respect to their application to modern business conditions. The Supreme Court also disposed of the contention that combinations not in violation of the anti-trust laws must take place through a merging of corporation interests. On this point Chief Justice Hughes declared:

"We know of no public policy, and none suggested by the terms of the Sherman anti-trust act, that, in order to comply with the law, those engaged in industry should be driven to unify their properties and business in order to correct abuses which may be corrected by less drastic measures. Public policy might indeed be deemed to point in a different direction. . . . We agree that there is no ground for holding the defendants' plan illegal merely because they have not integrated their properties and have chosen to maintain their independent plants, seeking not to limit but rather facilitate production."

Michigan Cement Plant May Be Investigated

That the Michigan State cement plant at Chelsea, Mich., is still a subject of interest is evident from a resolution recently introduced into the House of Representatives of that state. This resolution provides for an investigation of the conditions now existing at this plant for the information of the present legislature. At the time of going to press the resolution had been referred to the Rules and Resolutions committees but had not yet been reported out.

Universal Atlas Buys Material Service Dock

The Universal Atlas Cement Co. has acquired from the Material Service Corp. the dock property at the southeast corner of Ewing Ave. and the Calumet River in South Chicago, Ill. No immediate utilization of the land is planned by the cement company, according to B. F. Affleck, president, but improvements will be made as soon as it is justified by improved business conditions.

Installs Batching-Bin and Enlarges Its Dock

★ The Erie Sand & Gravel Co., which operates a dock and a screening-and-storage plant at Erie, Pa., has added a 160-ton Erie steel batching-bin to its equipment. An addition to the dock, which will double its capacity and allow the handling of crushed stone, cement and other materials in addition to sand and gravel, is also being contemplated.

500-Ton Crushed-Stone Plant for Kelly Run Firm

★ The Kelly Run Stone Co., Wilkes-Barre, Pa., is building a new 500-ton crushed-stone plant. The Traylor Engineering & Mfg. Co. is furnishing a 24-in. by 36-in. welded-steel-frame jaw crusher, a 12-in. B. H. reduction crusher, a 36-in. by 12-ft. feeder, and a number of bin gates for this plant.

Cement Output Gains in Oil-Burning Plants

GAS CONSUMPTION DECREASES

The production of cement in February was 9.3 per cent. greater than in January, most of the increase occurring in the plants using oil as fuel. The amount of oil consumed increased 21.3 per cent., or more than twice as fast as cement production; the amount of coal used increased only 2.4 per cent., or only a little more than one-fourth as fast as production; while the use of natural gas decreased 3.5 per cent.

As summarized from the reports of cement producers, the following quantities of fuel were consumed at the Portland-cement plants in the United States in the month of February, 1933, in the production of 2,777,000 bbl. of finished cement: Coal, 140,730 short tons; oil, 73,215 bbl. (or 3,075,030 gal.); and natural gas, 1,038,149,000 cu. ft. The producers also reported 208,975 short tons of coal in stock at the mills at the end of February, 1933.

Corresponding figures from the producers' reports for January, 1933, are as follows: Finished cement produced, 3,036,000 bbl.; and fuels consumed in its manufacture—coal, 144,248 short tons; oil, 88,842 bbl. (or 3,731,364 gal.); and natural gas, 1,007,367,000 cu. ft. The producers also reported 221,224 short tons of coal in stock at the mills at the end of January, 1933.

In addition to the above fuels one plant reported the use of gasoline in February; and one plant in January and two in February reported the use of petroleum coke. These plants also reported the use of other fuels.

Bode Gravel Co. Spends $20,000 for Rebuilding

★ Fire practically destroyed the sand-and-gravel plant of the Bode Gravel Co. at San Francisco recently, but scarcely had the ashes of the ruins cooled before officials of the company began plans for rebuilding. The new structure and equipment will represent an investment of more than $20,000, it is reported. The plant and pit are located at Alameda St. and 15th Ave.

Arizona Jobless Want State Cement Factory

"UNTIL DEPRESSION IS OVER"

Arizona is the latest addition to the growing list of states considering putting their respective governments in the cement business. The Arizona plan contemplates the erection of a $350,000 cement plant to be operated by the Community Council of Men for Unemployment Relief "until the depression is over." The council, whose representatives have proposed the cement-plant project, is also urging the colonization of 1,000 acres of land in the lower Salt River valley and other relief programs.

In speaking of the cement plant idea Representative Gynn said, "We have found this—regardless of whether it's a scheme for a cement plant, colonization, or what—you've got to have money. That's what we are worrying about now."

The project has won the support of the local press as evidenced by the following comment by the Winslow, Ariz., *Mail*.

"It is too bad that this important question was not presented to the legislature by the governor in his message. Raising the question so late in the session limits the probability of the legislature taking any action on the matter.

"The manner in which the taxpayers of Arizona have been exploited by the out-of-state cement interests during the past years is shameful. Millions of dollars of taxpayers' money has gone to cement plants in California and Texas. Other millions has gone to pay freight on cement from these states into Arizona. All this, notwithstanding the fact that Arizona has ample deposits of suitable natural material for cement-making convenient to highway and railroad transportation.

"In all his several messages to Arizona legislatures former Governor Hunt urged the establishment of a state cement plant using convict labor, the product to be available, at cost, to the counties, municipalities and school districts. There has always been ample labor available at the prison, much of it supported by the taxpayers in partial idleness, because the legislature had not provided sufficient public work for the convicts to do. Several times, with the backing of Governor Hunt, bills providing for a state cement plant were introduced in the legislature. Each time this occurred the foreign cement interests would send a powerful lobby to the state capitol to defeat the bill. Glib promises were made by these agents that if the state did not establish a cement plant the trust would set up a cement factory in Arizona. Simultaneously inspired stories would appear in the Phoenix press describing the plans of the outside companies to construct at least one cement factory in Arizona.

"Following the adjournment of the legislatures without any action looking to the establishment of a state cement plant, nothing more would be heard for two years of plans of the cement trust to build an Arizona plant. Arizona taxpayers still continue to pay tribute to the cement factories of California and Texas. The surest way to obtain development of Arizona's cement resources and the employment of Arizona labor, in making the material used in this state, would be for the legislature to authorize a plant to be owned and operated by the state to make cement for all public purposes."

Rent Abandoned Mines for Growing Mushrooms

The Columbia Quarry Co., St. Louis, Mo., in March, 1932, leased a portion of its mined area at Valmeyer, Ill., to the Valmeyer Farms for the growing of mushrooms. This particular area of the mine was abandoned and was rather isolated, being off the main haulage road leading into the mine. This feature and the fact that this section had a separate opening was especially fortunate, as it keeps each operation from interfering with the other.

The old mine workings underlie a narrow ridge and are entered at ground level. As the rock outcrops on each side of the ridge the workings were driven to the "crop" for ventilation and these openings now ventilate the mushroom area. Mushrooms require a temperature of from 50 to 60 deg. F. and this was readily obtained by erecting frame walls or partitions at the openings, regulating the ventilation by screened slots in the walls. The natural temperature of the mine is about 55 deg. Further advantages for this project are the proximity of a water-supply, power lines and railroad facilities.

Buys New Machinery for Road-Surfacing Contract

★ The Utah Sand & Gravel Products Corp., Salt Lake City, Utah, recently purchased a 5-ft. by 8-ft. double-deck Stephens-Adamson vibrating screen and a 24-in. belt-conveyor of the same make equipped with ball-bearing carriers. According to Eric Ryberg, president of the company, this purchase was made necessary by a 11-mi. road-surfacing contract.

New Finish-Grinding Mill for Cement Plant

★ The Santa Cruz Portland Cement Co. recently completed another step in the improvement of its plant at Davenport, Cal., when it installed a new 10-ft. by 72-in. Hardinge mill in its finish-grinding department. This machine replaced a smaller unit of the same type.

Ottawa Silica Develops New Highway Product

TEST PAVEMENTS SHOW WORTH

The Ottawa Silica Co., Ottawa, Ill., has been experimenting for over two years with silica sand and asphalt mixtures and has developed a product which, it is claimed, can be laid cold and shipped as far as 300 mi. without solidification in the cars. This material can also be stock-piled. The silica used is 99 per cent. pure and makes a durable nonskid pavement. Several stretches of test pavement have been subjected to heavy traffic for almost a year and are standing up very well.

The company will produce this new product through a subsidiary, the Ottawa Asphalt Co. A storage, mixing and loading plant for the production of this material is now under construction and will be in operation about April 15. It will have a capacity of 50 tons per hr.

The product will be sold through another concern, the Silica Rock Asphalt Sales Corp., which was recently incorporated and is a separate organization from the above.

Question Rental of Gravel Firm's Tools

The Board of Supervisors of Livingston County, Ill., is under fire because it has been renting equipment from the Churchill Gravel Co. of Pontiac for use on its state-aid road work. During February the county paid the gravel concern $3,959.78 for the use of a tractor, an elevating grader and dump wagons on five different road jobs.

The Pontiac *Leader* asks some pertinent questions, among which are the following:

"What equipment was used for the building of county roads before the Churchill Gravel company bought a grader made available for rental to the county?

"Who is the Churchill Gravel company? Is it a partnership or a corporation? If it is a partnership, who are its real owners? If it is a corporation, who are the present holders of its capital stock?"

Cement-Plant Workers Gain from Higher Prices

The International Cement Corp. recently announced an increase of 10 c. per bbl. in the price of its "Lone Star" and "Incor" cements. At the same time it was announced that the compensation of hourly and weekly wage-earners was increased 10 per cent.

The Marquette Cement Co. also recently passed on some of the benefits from increased prices to its employees in the form of a 5-per cent. increase in wages. According to Richard Moyle, general superintendent, bookings are favorable and business generally has improved.

Relief Highway Labor Costs Found Excessive

CONCRETING COSTS DOUBLED

Some interesting facts with respect to labor costs of highway work being done to provide work for the unemployed with emergency funds furnished by the government and matched with the regular federal-aid allotment are being developed in the state of Mississippi. Contractors who are being compelled to use this unemployed and inexperienced labor under the regulations laid down for this work are finding their costs per square yard of concrete to be more than two-and-one-half times what it was formerly. One contractor stated that his labor cost for laying 1 sq. yd. of concrete is now 25.6 c. where as formerly it was 10.3 c.

Alpha Making $150,000 Cementon Betterment

★ The Alpha Portland Cement Co. is making extensive improvements to its plant at Cementon, N. Y., at a cost estimated at about $150,000. New driers are being installed for limestone and clay, and crushers and other equipment are being relocated in such a manner as materially to simplify the lay-out and operation of the plant. This department of the plant formerly had sufficient capacity to provide for the full requirements of the plant on the basis of 10-hr. operation per day. With the new lay-out and equipment it provides for 50 per cent. of plant capacity in 8 hr. If in the future the plant should be called upon for more than 50-per cent. capacity, the stone-crushing and drying department will be operated in two shifts.

Squirrel-Eradication Fight Lost by Cowell

A historic legal battle recently came to an end when the Cowell Cement Co. paid Contra Costa County, Cal., the sum of $2,574.90 in full payment of a verdict given in its favor in 1928, plus interest to the present time and costs. The payment brings to a close a suit on which was predicated a test of the constitutionality of the California state law that permits counties to eradicate squirrels on property on which the owner fails to act after due notification. The law specifies that the costs assumed by the county shall become a lien against the land.

Los Angeles Producer Wins Material Awards

Consolidated Rock Products Co., leading aggregates producer in the Los Angeles area as well as an important premixed-concrete producer, has received a number of important contracts recently from the municipality. These include 4,500 tons of sand per month for six months at $2,475 per month, for a total of $14,850; crushed rock for a six-months' period amounting to $138,932; and an undetermined quantity of premixed concrete to be delivered to the job under various specifications at an average price of $6.65 per cu. yd.

Will Spend $300,000 for New Sulphur Plant

★ The Freeport Sulphur Co., 52 Wall St., New York, N. Y., which was recently reported to be planning the erection of a plant near Harvey, La., has let the following contracts: Ingalls Iron Works, 400 tons of structural steel; Chicago Bridge & Iron Co., 383 tons of fabricated plate. The total cost of the plant, it is said, will be about $300,000. The J. F. Coleman Engineering Co., New Orleans, is consulting engineer. E. L. Norton is president of the company.

Laura Gravel's 1932 Sales Show Increase

Stockholders of the Laura Gravel & Stone Co., Phillipsburg, O., recently held their annual meeting at which the following officers were elected: Ed Mattis, president; Bob Kraus, vice-president; I. E. Baker, secretary and general manager; and Roger Baker, assistant secretary and treasurer. The financial report submitted at this meeting showed that sales in 1932 were higher than those in 1931, the various uses of limestone products giving the company a steady business throughout the year.

Illinois Stone Plant Under New Management

★ The Electric Limestone Co., Inc., has taken over the properties formerly known as the East St. Louis Stone Co. and the Illinois Electric Limestone Co., with quarries located at Falling Springs, Ill. The new management has already added new equipment and made expensive repairs to the plant and expects to start operations and make shipments as soon as the weather allows. The plant now has a capacity of 75 cars per day and when in full operation will employ 70 men. Several weeks ago a blast made in the quarry brought down about 80,000 tons of rock.

Lime Plant Operating at 70 Per Cent. Capacity

According to a statement recently made by Wallace Wing, manager of the Hannibal, Mo., plant of the Marblehead Lime Co., 35 men are now employed and the plant is operating at about 70 per cent. of capacity. The working hours of the employees were recently lengthened.

Northwestern Cement Increases Its Profits

LAND OBLIGATIONS ARE REDUCED

The Northwestern Portland Cement Co., Grotto, Wash., is among the few cement-manufacturing concerns in the country to report increased profits for the fiscal year ended Nov. 30, 1932. Taking into consideration the dormancy of building operations in the Pacific Northwest, the ability of the management to show operating profits of $88,302.29 for 1932 as against only $38,256.16 for 1931 is outstanding.

Current assets, of which $113,755.45 was cash, totaled $254,689.78, as against current liabilities of $11,050.04, or a ratio of 23.05 to 1. The statement for 1931 showed current assets totaling $251,489.68 of which $105,029.09 was cash.

Sand-and-gravel property-purchase obligations were paid off during the year out of earnings to the extent of $11,250, reducing that item from $21,000 to $9,750. The company has no funded debt, bank loans or notes payable.

Dividends paid during the year on the company's 13,500 shares of cumulative preferred stock totaled $6 a share. As a strong business safeguard, the company pays dividends only as earned, insuring a steady financial position.

J. B. John Reelected President of Petoskey

The annual stockholders' meetings of the Petoskey Portland Cement Co. and the Petoskey Transportation Co. were held recently at Petoskey, Mich. J. B. John was reëlected president and John A. Galster, treasurer and general manager of these associated companies. It was revealed that the plant has been overhauled and plans laid for greater production than in 1932.

Universal Birmingham Reopens on Part Time

The plant of Universal Atlas Cement Co., Birmingham, Ala., reöpened on a part-time basis Feb. 1. The company has secured delivery specifications for more than 90,000 bbl. of the 100,000-bbl. allotment coming from the state of Alabama to be used in highway construction.

Heumader's New Plant Has Diesel-Engine Power

★ According to a recent announcement by Wm. P. Heumader, president of the Heumader Quarries, St. Joseph, Mo., the company's new plant is now in operation. This plant, which replaced one destroyed by fire last spring, has a capacity of 70 tons per hr. and uses Diesel-engine power.

B. L. Boye New Head of Asphalt Institute

At its recent annual meeting the board of directors of the Asphalt Institute, elected B. L. Boye president of the organization to succeed William H. Kershaw of the Texas Co. Mr. Boye, who has been with the Standard Oil Co. of New York for 33 yr., is now in charge of that company's asphalt and fuel-oil activities. Other officers elected were: Vice-presidents, Leroy M. Law, Shell Petroleum Corp.; A. M. Maxwell, president, Standard Oil Co. of Ohio; and J. A. Blood, Standard Oil Co. of California. W. W. McFarland, president, Warner-Quinlan Co., was elected secretary and Herbert Spencer, Standard Oil Co. of New Jersey, was elected treasurer, with W. E. Gilligan of the same company as assistant treasurer. The board named C. W. Bayliss, Barber Asphalt Co., chairman of the new executive committee, with J. S. Helm, Standard Oil Co. of New Jersey, and Messrs. Boye and McFarland as the other members of that committee. J. E. Pennybacker continues as managing director of the Asphalt Institute.

Southern States Will Get Four New Plants

The American Potash & Super Phosphate Corp., Canal Bank Bldg., New Orleans, La., which was recently incorporated in that city with a capital of $250,000, plans to establish four plants. The principal one of these, it is reported, will be erected in the New Orleans area and will extract potash from feldspar and other potassium materials and will manufacture acid phosphate. The other plants are to be near Crystal City, Fla., Mobile, Ala., and in some part of Texas. Stephen F. Sherman, New York, is president of the company, and L. M. Turnbull is vice-president and general manager.

Cement Plant Has Best January in Four Years

The plant of the Universal Atlas Cement Co., at Independence, Kan., according to C. M. Carmen, superintendent, did more business in January of this year than in any January since 1929. In spite of the fact that the plant operated continuously during the month, less than 1,000 bbl. went into storage, as shipments were almost equal to production. Mr. Carmen expects this condition to last for some time. Highway and bridge construction is largely responsible for this demand.

Glencoe Lime Offers Masons "Cobbsment"

The Glencoe Lime & Cement Co., St. Louis, Mo., recently announced a new masonry mortar called Cobbsment. The advantages claimed for this product are: high workability and sand-carrying capacity; high compressive and bond strengths, low shrinkage, and the fact that it is waterproof. This product is named after the founder of the company, Col. C. W. S. Cobb, who was president of the company for more than 40 yr.

Central Silica Will Build Near Collinwood

★ The Central Silica Corp., Comer Bldg., Birmingham, Ala., was recently incorporated in Tennessee to produce silica, clay and other nonmetallic minerals. The company owns property near Collinwood, Tenn., and it is reported that loading and storage sheds are to be built there. The material is to be shipped to the company's plant in Birmingham for processing. The company was incorporated by Robert H. Carson, Kirk Henry and F. Robert Switzer, all of Birmingham.

New Equipment Bought by Central Rock Sand

★ The Central Rock & Sand Co., Kingsport, Tenn., recently began the manufacture of pulverized limestone for fertilizer, according to Harvey Brooks, manager. More than $2,500 was spent on equipment and the product will be sold in bulk or in sacks.

City-Owned Quarry Shows Annual Deficit

COSTS 26% ABOVE INCOME

The city of Marquette, Mich., has added its testimony to the mounting accumulation of evidence illustrating the waste of government operation of what is more economically done by private enterprise. During 1932 a total of 4,091 tons of crushed rock, worth $9,283 was produced at the city's quarry and crushing plant near Harvey. Operating expenses for the year amounted to $11,716, leaving a deficit of $2,433, which was charged to the street fund at the close of the year.

Because of the curtailed street program in 1932 only 3,696 tons of rock from the crusher was used on city streets. This rock was worth $8,794, the street department being charged $2.50 a ton for most of it.

It cost $4,837 to operate the quarry in 1932 and of this amount $3,571 was paid for the labor. Operating the crushing plant cost $3,914, the largest charge there being $2,213 for repairs. It cost $1,894 to operate the Crescent St. rock bins and $1,076 of this amount was spent for repairs.

The city auditor's statement of the quarry-fund account as of Dec. 31, 1932, follows:

Tons	Lb.			
Credits—				
Rock charged out for city work:				
565	470	crushed rock @ $2 per ton	$1,130.48	$
3,030	1,500	crushed rock @ $2.50 per ton	7,576.89	
27	1,710	rock dust @ 50c per ton	13.93	
72	1,875	rubble @ $1 per ton	72.94	
3,696	1,555	Total		$ 8,794.24
Rock Sold—				
132	1,465	crushed rock @ $2 per ton	265.47	
15		crushed rock @ $2.50 per ton	37.50	
141	1,525	rock dust @ 50c per ton	70.87	
13	350	rubble @ $1 per ton	13.17	
92	1,000	rubble @ $1.10 per ton	101.75	
395	340	Total		$ 488.76
4,091	1,895	Total output		$ 9,283.00
		Add—Deficit charged to street fund at close of year		$ 2,433.58
		Total		$11,716.58
Expenditures—				
Operating quarry—				
		Labor	$3,571.11	$
		Dynamite, etc.	303.38	
		Repairs	411.83	
		Tools	69.80	
		Electric power	340.83	
		Miscellaneous	140.47	$ 4,837.42
Operating Crusher—				
		Labor	$ 188.52	
		Electric power	341.74	
		Repairs to equipment	2,213.72	
		Repairs to building	449.10	
		Repairs to bins	483.53	
		Oil and supplies	237.56	$ 3,914.17
		Taxes, Insurance and Royalty		1,070.52
		Crescent St. rock bins—		
		Freight on crushed rock from quarry	$ 679.80	
		Dumping and loading—labor	138.66	
		Repairs and sundries	1,076.01	$ 1,894.47
		Total		$11,716.58

Rochester Public Library

Engineering Projects To Cost $800,000,000

GOING JOBS TEN TIMES 1932's

According to recent information, over $800,000,000 will be spent on a half-dozen huge engineering projects and the 1933 highway program in 11 western states during the next year. Engineering construction projects totaling $33,169,790 got under way in January, 1933, in the Far West, compared with $3,482,726 a year ago.

Northern Indiana Gravel Suffers Small Fire Loss

Fire caused by an overheated stove in the tool and supply house of the Wolcottville, Ind., plant of the Northern Indiana Sand & Gravel Co. recently resulted in a loss of about $6,000. The building is of steel-and-timber construction. The fire was quickly extinguished, the greatest being caused by heat and water to tools and supplies in the building. The cab of a locomotive standing near was also damaged. The loss is covered by insurance.

Portland Cement Assn. Transfers Bureau Heads

W. D. M. Allan, manager of the Cement Products Bureau of the Portland Cement Assn. since 1926, has been appointed director of promotion with responsibility for the planning and direction of the following six bureaus: Advertising and Publications, General Educational, Cement Products, Highways and Municipal, Railways, and Structural. W. G. Kaiser, assistant manager of the Cement Products Bureau for over 10 yr., has succeeded Mr. Allan. C. R. Ege, manager of the Advertising and Publications Bureau, has been appointed assistant secretary of the association.

To Furnish City Gravel at $1.83 a Cubic Yard

The city of Eureka, Cal., has awarded a contract for 1,000 cu. yd. of wash-and-screen gravel to the Mercer-Fraser Co. of Eureka at its bid price of $1.83 per cu. yd. The material is to be used in municipal work this spring and will be produced at the Mercer-Fraser plants in Eureka and Fernbridge, Cal.

Material Service Sales Fall Nearly 50 Per Cent.

Ill., and affiliated companies for 1932 report a consolidated net income of $36,902, equal to 29 c. a share on the capital stock outstanding, compared with $302,080, or $2.41 a share, in the preceding year. Sales were $2,943,721 and $5,648,315 respectively.

The consolidated balance sheet as of Dec. 31 last showed current assets of $1,327,053, including $14,965 in cash. Current liabilities amounted to $769,272, including $491,881 of bank loans. This compares with current assets of $1,501,784, including $34,587 in cash, and current liabilities of $609,103, including $95,000 of bank loans, but excluding $341,333 of notes due within one year at the end of 1931.

Cone Crusher Added to Erwin Feldspar Plant

★ The Erwin Feldspar Co. recently installed a Symons 4-ft. short-head cone crusher at its plant at Erwin, Tenn. A 3-ft. crusher of the same type had previously been installed at the company's plant at Kingman, Ariz.

Sand-and-Gravel Boat Rescues Flood Victims

The steamer "Mac," owned by the Portsmouth Sand & Gravel Co., Portsmouth, O., played an important part in the rescue work in the lowlands near that city during the recent flood of Ohio River. This vessel, under the command of Capt. Harry King, rescued 25 persons marooned in their homes by the flood waters, many of them in danger of being swept away at any time. Capt. King had noticed these homes while dredging in that vicinity and when the water became dangerously high decided to cruise that vicinity to see if any help was needed.

Columbia Quarry Krause Plant Is Being Improved

★ The Columbia Quarry Co. is making several changes in its plant at Krause, Ill. The equipment being installed includes two Stephens-Adamson 4-ft. by 8-ft. double-deck vibrating screens and three belt-conveyors, of the same make equipped with Simplex carriers having Timken roller-bearings.

North American Cement Recalls 160 Workmen

The Security, Md., plant of the North American Cement Corp. resumed operations March 1, calling about 160 men back to work. While no great demand is expected for some time, the government is using some cement for construction in Washington and some road work is also being done.

Building Lime Plant Near Buchanan, Va.

The James River Hydrate & Supply Co., Buchanan, Va., is constructing a plant near that point on the Norfolk & Western R. R. and has a capital of $200,000. L. P. Dillon, of Indian Rock, is president; F. C. Dillon is secretary and treasurer; and J. H. McNamara of Eagle Rock is vice-president.

New York Trap Rock Reduces Loss to $28,845

The report of the New York Trap Rock Corp. and subsidiaries for the year ended Dec. 31, 1932, certified by independent auditors, shows a net loss of $190,950 after interest, federal taxes, loss on property retired, depreciation, depletion and minority interest, but exclusive of surplus credit items. Including a $149,132 profit on bonds and debentures retired and $12,973 refund of federal income taxes for prior years, the net loss for the year was $28,845.

For the year ended Dec. 31, 1931, net income was $931,970 after taxes, charges, depreciation, adjustments, etc.

The statement of the New York Trap Rock Corp. and subsidiaries as of Dec. 31, 1932, shows total assets of $23,091,257, comparing with $23,890,031 at the end of 1931, and capital surplus of $1,020,336 and profit-and-loss surplus of $4,874,770, against capital surplus of $322,836 and profit-and-loss surplus of $6,254,475 for 1931. Current assets, including $311,263 cash and marketable securities, at cost, amounted to $1,698,350 and current liabilities (exclusive of sinking fund requirements) were $688,525. This compares with cash and marketable securities at market, of $1,106,099, current assets of $3,433,972 and current liabilities of $827,267 at close of the preceding year. The capital stock consists of 20,000 no-par shares of preferred and 180,000 no-par shares of common.

Old Missouri Gravel Officials Reelected

The Missouri Gravel Co. held its annual meeting at La Grange, Mo., on Feb. 7. The following officers and directors were reëlected: James P. Pearson, president; Chas. C. Loptien, vice-president; Oscar W. Ellis, secretary and treasurer, all of Moline, Ill.; C. D. Harvey, Quincy; D. A. Childers and W. E. Oyster, La Grange; John Fierke, Hannibal; D. O'Brien and Fred Lohmeyer, Louisiana.

Buys Railroad's Gravel Pit at Pine Lake, Mich.

The Chicago & Northwestern Ry. recently sold its sand-and-gravel pit at Pine Lake, Mich., to J. S. Kennedy. The new owner plans to install a modern crushing-and-washing plant and intends to market the product on the Gogebic range for road-building and commercial purposes.

★ The Dean St. Builders' Supply Co., Taunton, Mass., recently installed a new Stephens-Adamson steel hopper and a 16-in. by 126-ft. belt-conveyor with Stephens-Adamson carriers in its plant in that city.

Editorials

Society Carries the Burden

THERE are still plenty of men who can recall the days when life was less complex, and when the problem of earning a livelihood was more within the control of the individual than is the case to-day. In those times there appeared to be no excuse for failure in the struggle for existence, because, by comparison with our own day, there were fewer hidden obstacles, there were fewer individually-insurmountable barriers, to the attainment of a comfortable sufficiency. Wealth of all kinds—at least all the kinds necessary in a much simpler scheme of living—lay in abundance in the ground, and its recovery and utilization were almost entirely problems of individual initiative and skill. The truth that "the world owes every man a living" was more obvious under such conditions than it is now, when even a bare living is attainable only through effort applied indirectly and, therefore, at much higher cost. In the simpler economy every man could apply his willingness to work and his knowledge and skill directly to the acquisition of the commodities he required; to-day these can be obtained only by his working indirectly for them under a system that has substituted a symbol of wealth for the wealth itself.

Not only must the man who would succeed in the modern struggle for existence be willing to work for his livelihood. His services must be in some sort of quasi-public demand, he must be willing to sell them on terms which he can not fix, and he must then purchase his livelihood in the open market, again on terms which he can not fix. His working ability may remain fairly constant, his willingness to work and his ambition may show no change, but his ability to earn his living may vary greatly. All the qualities necessary to success under the old system may be at their peak and yet, as so often happens at present, they may avail him nothing.

The experiences of the last few years have thrown us back on some of the fundamental truths, which the prosperity of the post-war period had obscured, and the ability of the world to supply sustenance and comfort for every work-willing man is one of them. Everywhere under present-day conditions those who have are being asked to share with those who have not. To the ordinary pleas for individual charity, dependent on the giver's spirit of generosity and brotherly feeling, have been added the demands of the law, which, recognizing the need for correcting some of the inequities and inconsistencies of modern wealth distribution, are expropriating the wealth of those who have and spreading it among those who have not. Those who could not be importuned into helping their fellow men are being compelled to do so. A society that was unwilling to recognize and act upon the principle of the interdependence of its members has been forced to admit the truth that "the world owes every man a living," and, when he can not obtain that living by his own efforts, to provide it for him. Having leaned too heavily on the theory of "rugged individualism," we are being taught to be socially-minded, to know that even the favored few can not continue to add to their stock of wealth or wealth-producing goods as they have done unless the same privilege is accorded to the multitude, and to feel responsibility for, rather than an indifference to, the well-being of others.

Public funds are being diverted from the uses for which they were collected in order to provide for the unemployed. Sales taxes and other expedients are being discussed and adopted with the same objective. The poor, heretofore largely dependent on the donations of those of philanthropic spirit, have now become, through sales taxes and federal lending, a charge on the earning power of the employed and the rich. Society, too long indifferent to the obligations which rest rightfully upon it, is for the first time being made conscious of its responsibility to its members and, also for the first time, is being made to pay directly by out-of-pocket expenditures for the sustenance of its unfortunates.

This is bitter medicine for the die-hard individualists who, comfortable in what they considered a divinely-bestowed security, were too willing to convert a "live-and-let-live" philosophy into a "live-and-let-starve" practice. But, like all hurriedly-concocted remedies, this new principle of public support for the unemployed may conceal or even partially remove the symptoms while leaving the disease untouched. It undoubtedly has its advantages—and certainly the relief of public distress can not be anything but a social advantage—but it also has its disadvantages, chief of which is the fact that, in spite of a confusion of names and numerous attempts to disguise its true character, public support is public charity. And this, we believe all intelligent people will admit, is not an activity of which modern society should be proud, or one which it should be content to tolerate as more than a temporary expedient for which a sound and practical substitute must be found.

Whether men work for their livelihood or obtain it through public charity, society pays for their keep. Both the wages of their employment and the wealth they consume through public support come from the labor-fund of society; on that point there it not much to choose between gainful employment and idle living. But men who live on charity perform no service useful to society, their time is wasted, their potential work capacity is not utilized, they spend only the small amounts which are given them from public funds; these are some of the

economic losses to society of charity-supported idleness. Their *morâle* is lowered, their belief in the necessity of working for a livelihood is impaired if not destroyed, they are encouraged to look to the state for the performance of commissariat as well as police duties; these are some of the spiritual losses to society. To a large and already overburdensome class of idle rich our present scheme of public support for the unemployed adds an even larger and even more burdensome class of idle poor whose upkeep falls most heavily on the in-between classes who are the hardest-worked and the poorest-paid and, therefore, the least able to carry the load.

Present plans for the relief of the unemployed are economically and spiritually unsound. The unemployed worker, fed by charity, soon becomes a habitual shirker. Potentially an economic asset, he is allowed to become and is encouraged to remain an economic liability. Employed, he leaves physical evidence of his labor, he earns more than his bare keep and he spends most of or all his surplus for the commodities whose manufacture and sale support industry. Unemployed, he consumes without producing, he spreads disaffection among his fellows and bitterness among those who contribute most to his support, and he longs to convert into a perpetuity what is intended to be but momentary relief.

Since business has shown no capacity—perhaps even no desire—to contrive a permanent solution of the unemployment problem, and since, even when individual conditions do not justify such action, business is more inclined to reduce than to increase the amount and wages of employment, the state has been forced to step in and, by virtue of its taxing power, redistribute, as far as it can or as far as seems necessary, the wealth of society in the best interests of society. With the fairness of this method as a temporary and emergency measure most of us will have no quarrel. For years we have pushed steadily forward as individuals, believing, perhaps, that there was no limit to the extent to which we could improve our individual fortunes at the expense of our fellows, and now the profits of our efforts are being taken from us and redistributed among some of those whose extremity in the past we held to be our opportunity. So that, in the long run, much of our scheming and fretting has been done in vain; the fruits of the advantages which we possessed or acquired and developed so assiduously and, sometimes, so selfishly are being parceled out to those who in many instances may have had a higher economic and moral claim to them; and we are being compelled to recognize the economic soundness of primitive man's doctrine of the "brotherhood of man."

If the unemployed must live at the expense of the rest of society, let society give them employment as well as support. If a man must live on society—and most of us, we believe, will agree that he must—let him work for society. If keeping him at society's expense increases the burden of society's taxation and indebtedness, why not add to the wealth of society by applying his unused work capacity to publicly-useful tasks? He draws on society's reserve wealth for his living; let society draw on his reserve energy for society's enrichment.

As matters stand society is expending fabulous sums to support a new class of idlers and nothing of compensatory value comes to society in return. Already crushed under the financial burden of huge governments, whose ramifications reach out into every walk of life and add each year large numbers of people to the already enormous list of public job-holders, society is now supporting in idleness hundreds of thousands of persons who are being taught the habits of economic parasitism. New burdens are being added almost daily to meet the continually growing needs of our unemployed, and new means are being sought to make the necessary money available.

Society carries the burden of this huge waste; let it devise ways of transforming this waste into a gain. Give the unemployed the sustenance to which their residence in a land of plenty and their willingness to work entitle them, but recompense society by putting them to work on highways and other public utilities and conveniences. If society's wealth is to be depleted in one direction, it must be replenished in other directions.

Higher Prices and Wages

WE have frequently pleaded for the raising of prices and the raising of wages. It has seemed obvious to us, as it has to many others, that satisfactory profits could not be realized until prices were raised to profit-making levels and that the purchasing power of labor could not be increased until wages were raised to surplus-providing levels. But, like many other obvious truths, this one, so important to national economic welfare, has been almost neglected by business men.

It is perhaps natural that the cement industry, wherein prices sank to unheard-of low points, should provide, as related elsewhere in these pages, two of the first examples of manufacturers raising their prices and their workers' wages at the same time. Aside from the wholesome efforts on buying power which this action will have in these two instances there is the powerful evidence they provide of these companies' desire to pass part of the gains of higher prices to their workers instead of directing all to the profit account.

At a time when cement manufacturers are being subjected to much adverse criticism because of their attempts to raise prices to profitable levels at least two companies have shown that in seeking to restore proper prices they have an objective that embraces the interests of their workers as well as those of their stockholders. Like all other types of industry, the cement trade is entitled to a profit on its operations and its workers deserve a wage somewhat above the bare-subsistence level.

Possibilities of Greater Fuel Economy in Wet-Process Cement Making

Factors Determining Desirability of Installing Mechanical "Fuel-Savers"

By A. W. ROBINSON

WHILE fuel has always been the largest single item of cement-production cost, it is now more important than ever, for although other costs have been materially reduced, the cost of coal—largely freight—remains practically constant, and consequently has become an even larger proportion of production costs than ever before.

Much improvement has been made in wet-process cement-fuel rates during recent years, a considerable portion of which has been accomplished by a study of burning conditions and by the application of the knowledge so gained. The major part, however, has been due to the introduction of new equipment for reducing the heat losses from the kiln and the heat required in the kiln.

Each of several items of equipment has had its part in the reduction of fuel rates, and it is interesting to study the results obtained by each, with a view to determining their relative importance and possible further fuel economy to be gained by combining them. As the equipment in question is in general use, and hence familiar to the industry, no detailed description of the machines will be attempted here. A consideration of waste-heat boilers will be omitted, for although they naturally have their place in utilizing waste heat, they do not reduce the fuel burned in the kiln.

With wet-process kilns fuel savings have been accomplished by four distinct means:

1. Reduction of the heat losses at the feed end of the kiln, by lowering the exit-gas temperatures and using in the kiln the heat thus saved. Means of such reduction are:

a. Installation of heat exchangers in the kiln to improve the rate of exchange of heat between the hot gases and the raw material—lifters, chains, or baffles.

b. Lengthening the kilns from a former maximum of 250 ft. to from 300 to 400 ft.

2. Reduction of the heat losses at the firing end of the kiln by the installation of efficient clinker coolers for preheating the combustion air to the highest possible point.

3. Reduction of the amount of heat required in the kiln by lowering the moisture content of the slurry through filtration.

4. Better regulation of burning conditions by such means as:

a. Draft fans.

b. Continuous exit-gas analyzers.

c. Better coal drying, grinding, and feeding.

These will be discussed in the order named.

1. Reduction of Exit-Gas Temperatures.—It is obvious that, with other conditions the same, the reduction of exit-gas temperatures, and the utilization in the kiln of the heat thus saved, will lower the fuel rate accordingly. This has been accomplished successfully by: (1a) the use of heat exchangers, such as lifters, chains or baffles of various kinds, and (1b) by increasing the length of the kilns.

1a. Feed-End Heat Exchangers.—In a number of kilns—a few even less than 200 ft. long—dense curtains of chains, or series of lifters or baffles, have been installed in the feed end to facilitate the heat transfer between the hot gases and the slurry. These devices, of whatever design, absorb heat from the gases, and transfer it to the raw material when they pass down into it. This improved heat transfer, of course, lowers the exit-gas temperature and reduces the fuel rate accordingly.

The reduction of exit-gas temperature depends in individual cases upon the kiln length, the number and the density of the heat exchangers, the kiln-feed moisture, the kiln output, and the presence or absence of draft fans. Naturally, with shorter kilns the heat exchangers must not extend too far into the kilns or they will be burned off. The kiln output can not be forced or, again, the heat exchangers may be burned off. (In some cases temperature-controlled water-sprays have been installed, so that if the temperature becomes too great for the safety of the heat exchangers, water is introduced into the kiln to cool it off. This, of course, temporarily defeats the purpose of the heat exchangers, but for their safety it is thought by some users to be a necessary precaution.) For the best results draft fans are desirable to draw the gases through the heat exchangers, and to regulate the draft so that they will not be burned off.

Due to the above conditions the results reported from the dozen or more installations investigated show considerable variation, some reporting fuel savings as great as 10 to 15 per cent., while others have shown no appreciable results and have been removed. The effect on the kiln output has also varied, ranging from a reduction of 10 per cent. to an increase of the same extent. A reasonable average seems to indicate a fuel reduction of 5 to 10 per cent. with no appreciable change in the kiln output.

1b. Long Kilns.—Six or eight years ago the longest kilns in operation were 240 ft. long and gave exit-gas temperatures around 1,000 deg. F. Since that time, however, it has proved practicable

to build much longer kilns, and at present there are in this country some eight plants with kiln lengths ranging from 300 to 400 ft. Where chains and draft fans have been installed in the feed ends of these kilns, exit-gas temperatures in some cases as low as 450 deg. F. have been obtained. This lower temperature, which is some 300 deg. less than that obtained on a 250-ft. kiln with heat exchangers, represents a considerable saving in fuel, this saving depending in individual cases on the reduction in exit-gas temperature obtained and on the raw-material conditions.

In no case, however, has the reduction in exit temperature been accomplished by simply lengthening the kiln, for, in one instance at least, a 300-ft. kiln without a draft fan or heat exchangers in the feed end had an exit-gas temperature of 1,000 deg. F., even with the slurry moisture at 45 to 50 per cent.

At most long-kiln installations efficient coolers, draft fans, heat exchangers, and, in the latest ones, electrical exit-gas analyzers—each in itself a fuel-saver—have been installed at the same time as the long kilns, so that it is impossible to determine from them just how much of the saving is accomplished by the kiln length alone. In one case, however, with different-length kilns operating on the same slurry, the fuel rate on the one "long" kiln, fitted with chains, an efficient cooler, an electrical gas analyzer, a draft fan, and elaborate kiln-control equipment, is approximately 16 per cent. lower than that obtained on a kiln which is 130 ft. shorter and has no cooler, gas analyzer or kiln-control equipment. The cooler on the "long" kiln is recognized as one of the best on the market to-day, and should certainly be credited with at least half of this difference.

There is no question that the long kiln makes heat exchangers in the feed end more effective, for it allows a greater number of them to be installed and reduces the danger of burning them off.

2. Reduction of Heat Lost at Firing End of Kiln.—The preheating of combustion air by means of heat otherwise lost with the clinker is a very important means of reducing the heat required from the fuel and, hence, of lowering the fuel rates. For years the simple rotary cooler has been used with more or less indifferent success. It was, however, originally conceived when fuel rates were high and large amounts of combustion air were required, so that a high rate of heat transfer was not essential. With the gradual reduction in fuel rates, however, the combustion air required has been reduced, and coolers originally installed have become entirely inadequate, both as clinker coolers, and as preheaters of combustion air. Infiltration of air between the coolers and the kilns also reduced the cooler efficiency.

European practice has given us several types of coolers, made integral with the kiln, eliminating the infiltration between cooler and kiln, and designed to give much better heat transfer between the clinker and the air. They must be designed, however, for a given fuel rate and a given kiln output, and if the kiln output be increased or the fuel rate decreased, it is likely greatly to lower the efficiency of the coolers or even burn them out.

Recently an entirely new principle of cooling has been introduced, which is more flexible than any yet used, and has given extremely satisfactory results, both as to clinker cooling and air preheating. This principle calls for the blowing of air up through a bed of clinker, that air required for burning striking the hottest clinker and going to the kiln, and the excess beyond that required properly to cool the clinker being wasted. The amount of air used can be varied by the fan, and the proportion going to the kiln can be regulated, so that this equipment should be readily adaptable to any kiln output or fuel rate obtainable.

3. Reduction of Heat Required in the Kiln by Slurry Filtration.—It is a fact, pretty definitely established by the many filter installations now operating, that slurry filtration lowers fuel rates in direct proportion to the water eliminated from the kiln feed. This proportion, of course, changes somewhat with the thermal efficiency of the kiln and the exit-gas temperature, the largest saving per pound of water eliminated being naturally obtained with the shortest kilns and with the highest exit-gas temperature. The fuel saving in percentage of the original fuel rate, however, has been about the same on the long as on the shorter kilns, when the water eliminated has been the same.

The data on fuel saving with filters alone have been more definite and easier to obtain than in the case of the other fuel-saving devices, for in most instances the filters were installed on kilns previously operated without them and where no other changes, aside from the filters, were made. The savings effected have, of course, varied a great deal, due to the difference in the conditions met, such as kiln length, slurry moisture and water eliminated, presence or absence of waste-heat boilers, coolers, draft fans, or other auxiliary fuel-savers, but in general have ranged from 20 to 25 per cent. of the original fuel rates, depending mainly upon the amount of water eliminated from the slurry.

Filter installations have been made on kilns ranging from 100 to 300 ft. in length, using all types of raw material, with and without rotary coolers, but as yet there is no installation combining filters either with kilns longer than 300 ft., heat exchangers of any type, any of the more efficient types of coolers, or draft fans (except in connection with waste-heat boilers).

4. Regulation of Burning Conditions.—(a) The importance of draft fans in the regulation of burning conditions and in the accomplishment of fuel economy has been demonstrated in many installations. They are, of course, a part of every waste-heat-boiler installation. They have also proved a necessity on the long kilns and wherever efficient heat exchangers are used in the feed end of the kiln. It is impossible in present installations to segregate the proportion of fuel savings creditable to the fans alone, but, in considering long kilns or heat exchangers, it should be borne in mind that the draft fans are necessary auxiliaries to them and should be credited with a part of the fuel saved.

It is a pretty well established fact that on any kiln with exit-gas temperatures low enough for fans to be used, their installation will even up the draft, regardless of barometric or other varying conditions, and will undoubtedly be a forward step in the direction of fuel economy.

(b) The use of continuous exit-gas analyzers is a comparatively recent development in the cement industry, and there are as yet only three or four installations in operation. The fuel saving credited to them by their users amounts to 2 or 3 per cent. of the fuel burned. It is quite evident from observation of the kilns in operation, whether operating with and without these devices, that they eliminate from the process of burning one element of uncertainty which had always theretofore depended entirely upon the skill and attention of the burner. They should consequently save some fuel, and tend to unify the quality of the clinker produced.

(c) The grinding and drying of coal for the kiln have been greatly improved in recent years, and further attention to this highly important phase of cement making should bring further economy. In spite of the improvement in coal feed screws, however, it is still almost impossible to feed coal uniformly to the kiln and to know just how much is being fed. Several installations have been made with individual drying and grinding units for each kiln. These have shown very interesting results and this direct firing system may solve the troubles almost universally experienced with the storage type of coal firing.

Summary.—The major "fuel-savers" discussed above attack the fuel-economy problem from three distinct directions: the heat exchangers and long kilns reducing the losses at one end of the kiln, efficient coolers reducing them at the other end, and filters reducing the necessary heat required in the kiln. Their relation to each other and to the overall fuel economy, can be rather clearly expressed graphically, by representing the fuel rate without "fuel-savers" as a three-dimension figure, such as a cube, each item of equipment being represented as cutting off a different side of the cube. From this it is readily seen that each "fuel-saver" installed alone will make a greater saving in pounds per barrel (although the percentage of original fuel rate is the same) than if installed with the others. This explains why filters put on long kilns with chains would not show as great a saving in pounds of coal per barrel as on short kilns without heat exchangers, and, conversely, why added kiln length and heat exchangers will not show as great a saving in pounds per barrel on filter-equipped kilns as on kilns without filters. However, if the cost of coal saved is sufficient to justify the investment, any of or all these means can be combined to get the lowest fuel rate possible with present available equipment and knowledge.

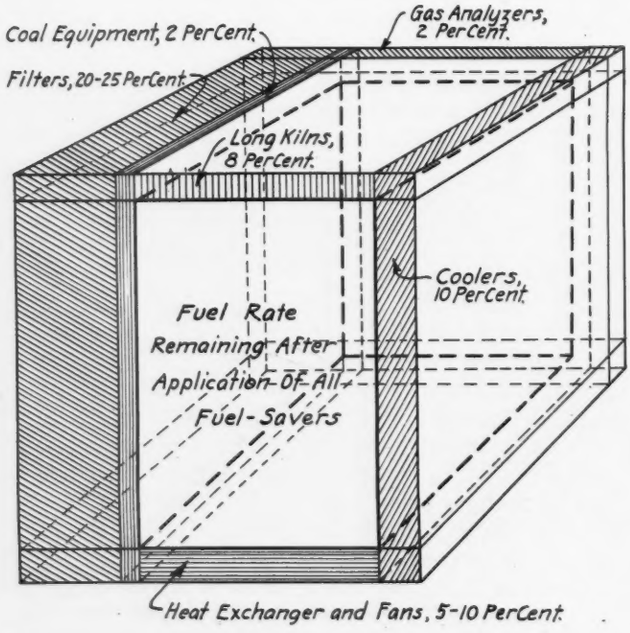

Coal Equipment, 2 Per Cent.
Gas Analyzers, 2 Per Cent.
Filters, 20-25 Per Cent.
Long Kilns, 8 Per Cent.
Coolers, 10 Per Cent.
Fuel Rate Remaining After Application Of All Fuel-Savers
Heat Exchanger and Fans, 5-10 Per Cent.

Diagram illustrating relative importance of various fuel-saving devices.

Filters have been used on kilns as long as 300 ft. with savings directly proportional to the water removed, and leaving exit temperatures at the same point as before the filters were installed, but they have never been used in connection with feed-end heat exchangers, with draft fans (except with waste-heat boilers), or with really efficient coolers.

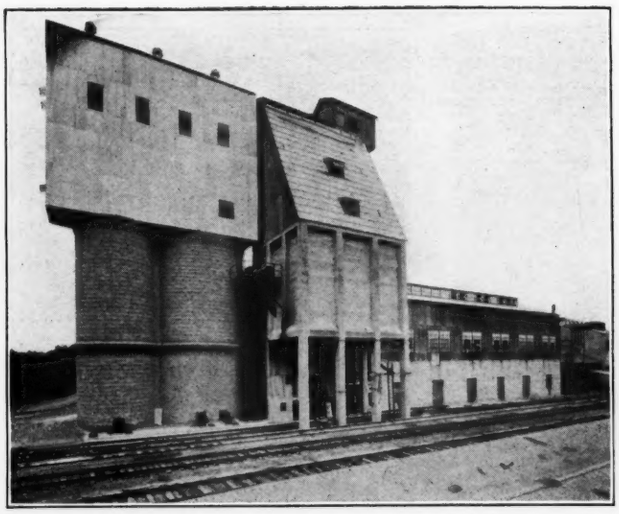
Chains and other types of feed-end heat exchangers have been used with good results on kilns long enough to prevent their burning out, and have been used with all the other "fuel-savers" except filters.

There is no logical reason, aside from cost, why filter-equipped kilns should not have heat exchangers installed, nor why long-chain-equipped kilns should not have filters, if the additional savings possible will make the investment worth while. As noted above, the heat exchangers hanging in the gases absorb heat and transfer it to the raw material when passing under and through it. With slurry feed the slurry which coats the heat exchangers gets some additional drying but also insulates the heat exchangers, so that they do not absorb so much heat as they would with filter cake. The broken-up condition of most filter cake should also make an easier heat transfer between heat exchangers and the raw material.

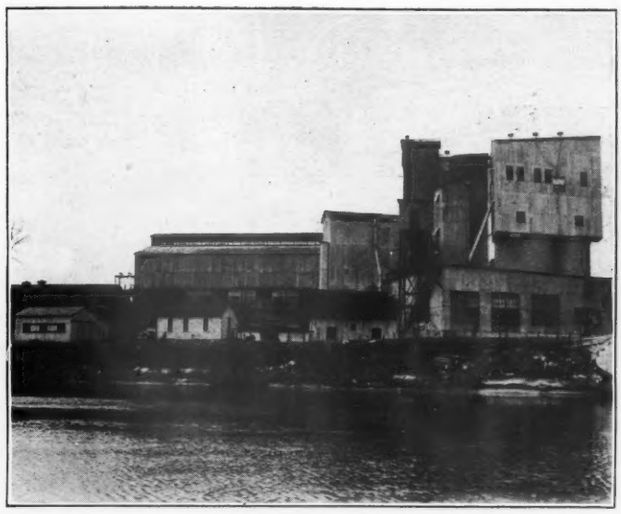
All the "fuel-savers" mentioned, except filters, have been tried together with very excellent resulting fuel rates. Filter-equipped kilns have as yet never had the assistance of any of the other devices, although at present a 300-ft. kiln with filters is being equipped with a new efficient cooler, and very interesting results should be forthcoming.

Going back to the savings effected by the various items alone, it is interesting to speculate upon the fuel rates possible with a combination of them all. An average filter installation will reduce the fuel rate 20 to 25 per cent.; heat exchangers and fans perhaps 5 to 10 per cent.; efficient coolers about ten per cent.; 130 ft. of length added to a 250-ft. kiln should decrease the fuel rate about 8 per cent., according to the only installation from which comparative data are available; exit-gas analyzers should save 2 per cent.; and 2 more points of per-

(*Continued on page 40*)



The new screening-and-storage building at left, old building in center and draining and drying building at right.



Main part of plant viewed from south bank of Fox River. Grinding building in right foreground and drying building at left.

Silica-Sand Producer in Ottawa District Well Equipped to Fight Silicosis

New Screens with Automatic Cleaners Make a Consistently High-Grade Product

By W. E. TRAUFFER

ONE of the most progressive producers of silica sand in the Ottawa district is the Wedron Silica Co. of Wedron, Ill. This company, whose plant is located on the site of one of the pioneer operations in the district, has not only improved its facilities from time to time to keep up with modern practice but was one of the first to realize the importance of keeping the plant dustless for the health and comfort of its employees.

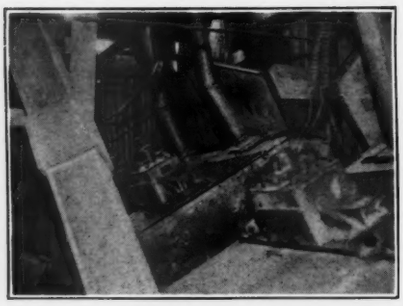
The plant is on the bank of Fox River in Wedron, 10 mi. north of Ottawa, and is on the Fox River Branch of the C. B. & Q. Ry. The deposit is an outcropping of the St. Peters sandstone found in and near Ottawa and is now the commercial silica operation farthest north of that city.

The history of this deposit goes back to the early days of the industry. The first plant was built at this location about 50 yr. ago. At the time it was purchased by the present company in 1912 it had a capacity of 8 car-loads per day. In 1920 a program of remodeling had just been started when the entire plant was destroyed by fire. The construction of a new and larger plant on the same site was immediately begun, and this went into operation early in the spring of 1922.

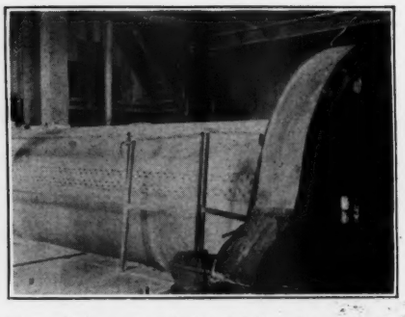
The 1¼-cu.yd. crawler gasoline shovel loading overburden into train of 5-cu.yd. cars to be hauled to dump.

This plant is built entirely of brick, concrete and steel and, on account of a few changes and additions made from time to time, has remained one of the most efficient and up-to-date operations in the Ottawa district. The dust-collecting system installed in the grinding department of this plant when it was built was one of the first installations of this type in the industry. In 1929 the present 4-bag packer and three steel feed-bins were installed. In 1931 a new screening-and-storage building was erected to supplement the original facilities. At this time the capacities of the drain bins in the drying building were increased by building up their sides about 4 ft. The present plant has a capacity of 150 tons per hr. with all departments operating, and employs 50 men.

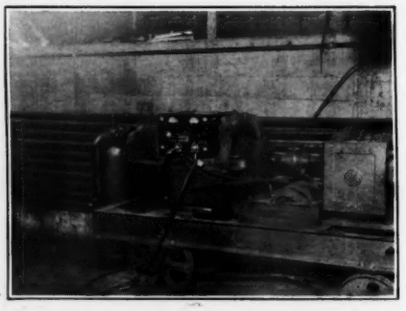
The overburden on the deposit averages about 30 ft. in depth and is removed by a Link-Belt



Some of the electric vibrating screens in the old screen-building.



One of the two 6-ft. by 22-ft. tube-mills in the grinding room.



The electric-arc welder which is connected to all parts of plant.

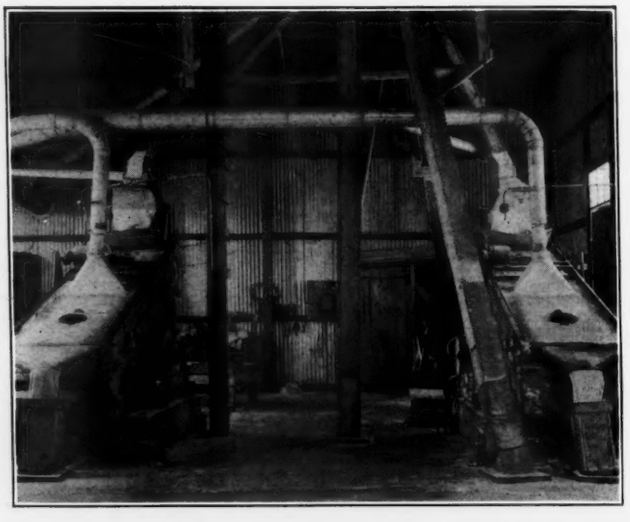
1¼-cu.yd. gasoline shovel. This loads trains of 5-cu.yd. Western side-dump cars which are drawn by a Whitcomb 12-ton gasoline locomotive and a Davenport 16-ton steam locomotive. The overburden is hauled about 2,000 ft. to a dump fill, which is kept level with a Seaverns spreader operated by a cable drawn by an American steam hoist.

The face, which runs from 75 to 125 ft. in height, is drilled with a 5-in. Armstrong gasoline-driven well-drill, the holes being drilled 25 ft. from the face and 30 ft. apart. Cordeau-Bickford safety fuse and 50-per cent. Du Pont special gelatin are used. Two holes are shot at a time and about 10 tons of material is shot down for each pound of explosive used.

Two hose streams, with a pressure of 125 lb., wash the material to a Knowles Pulsometer pump, which forces it through a 5-in. pipe-line a distance of about 2,000 ft. A second pump, midway between the intake and discharge points, acts as a "booster." The pipe-line discharges to the boot of a Victor balata belt-conveyor which has wooden cleats and carries the material at an angle of 50 deg. to the draining and drying building, allowing it to drain in the process. The conveyor discharges to a revolving scalping screen which removes any pebbles and foreign material over ⅛-in. in size and discharges them to a refuse pile from which they are carted away. The material passing through the ⅛-in. screen goes to a wash-bin, where it is agitated by water jets from pipes in the bottom of the bin and by hose streams directed on it from above. This process, which removes all the remaining foreign matter and clay binding material, is repeated in a second wash-bin below the first.

The washed sand is fed to a Pulsometer pump which discharges it to any of the four drain-bins, which have a capacity of 600 tons each. The sand is allowed to drain about 48 hr. and is then rehandled by a P&H 5-ton overhead crane fitted with a Blaw-Knox 1¼-cu.yd. clam-shell bucket, to the sand drier, which is in four sections alongside the drain-bins. The drier consists of layers of steam pipes which dry the sand as it passes between them. A draft induced by fans carries off the vapor through air ducts. The dried sand is fed to a 24-in. horizontal belt-conveyor operating on 100-ft. centers. This discharges to a steel-inclosed belt-bucket elevator which runs on 125-ft. centers and feeds the sand to a revolving scalping screen at the top of the original screening building. The over-size from this screen which has 1/16-in. openings, is chuted to waste.

The material passing through the screen is chuted to a hopper which controls the feed to the two screening buildings. Five spouts feed from this hopper to five smaller hoppers which in turn feed 12 Tyler Hum-mer 4-ft. by 5-ft. double-deck vibrating screens. These are fully inclosed with dust-collector connections and have 30-mesh and 50-mesh Ton-Cap cloth on their top and bottom decks respectively. The three sizes of material produced are, in the order of their sizes, used for sand blasting, glass manufacture, and stone sawing. These sizes are discharged in the order named, into three bins having capacities of 100 tons, 600 tons and 100 tons, respectively.

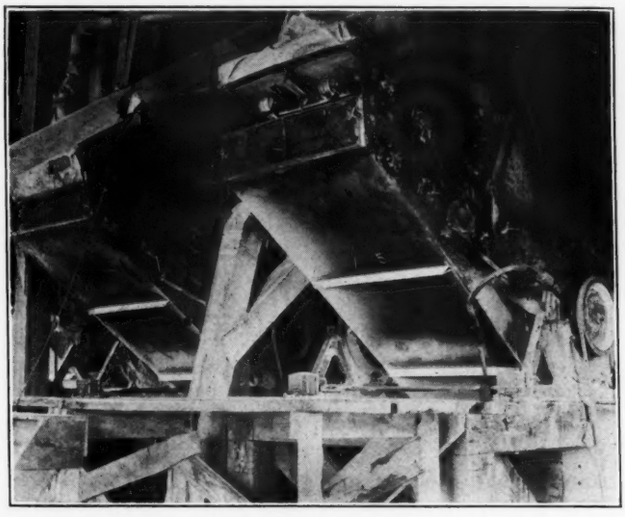


The two 3-ft. by 10-ft. double-deck vibrating screens on the top floor of the new screening building. Note inclosures and dust-

The bins discharge through gates and flexible spouts to a mechanical loader of the company's design. This consists of a belt-conveyor mounted with its motor and drive on a suspended frame and counter-balanced so that it can be swung into the door of the car and can load it fully to either end. This method makes it unnecessary for an employee to be in a car while it is being loaded, eliminating one of the most fruitful sources of silicosis, as loading a car is probably the dustiest operation about a silica plant. A Fairbanks track-scale under the old storage-bins weighs the cars empty and

loaded without necessitating extra handling. All the box-cars are coopered, swept and lined with Kraft paper before they are loaded.

The hopper at the top of the original screening building also feeds an 18-in. belt-conveyor which operates on 50-ft. centers and discharges to a 4-ton bin at the top of the new screening building. Spouts from this bin feed two 3-ft. by 10-ft. Productive Equipment Co. Jigger standard double-deck vibrating screens on the top floor of the building and three similar screens on the floor below. These



The three double-deck vibrating screens on the lower floor of the new screen-house. Brushing mechanism visible on screen at right.

screens are equipped with 30-mesh and 40-mesh cloth on their top and bottom decks. The three sizes produced are, respectively, blast sand, foundry sand, and special glass sand. All are chuted direct to storage.

These screens are completely inclosed and are connected to a dust-collecting system. Each screen is driven through a Gilmor V-belt drive by a 3-hp. motor and each deck is equipped with an automatic cleaner made by the Productive Equipment Co. This cleaner consists of a brush carriage which brushes the cloth in both directions from below. An automatic electrical timing device can be adjusted to operate the brush at any desired interval and can also vary the speed of the brush on each trip. Each cleaner is driven by a ¼-hp. Janette electric motor through fully-inclosed gears running in oil. Anti-friction bearings are used throughout, including the brush carriage.

These screens were installed with a guaranteed capacity of 4 tons per hr. each on this size of material and in operation have considerably exceeded this figure. The brushes on these screens keep the cloth clear at all times so that there is no variation in the capacity of the screens or in the accurate grading of the product, as is the case where hand-brushing methods are used. Because of the accurate grading possible with this equipment the product made brings the highest market prices.

The new screening building has a structural-steel framework and Wheeling corrugated-metal siding and roofing. It is supported on two reinforced-brick storage-silos, each 50-ft. high, one with a capacity of 500 tons and the other divided by a brick partition wall into two compartments having a capacity of 450 tons each. The type of reinforced-brick construction used is one developed recently by the Chicago Brick Co., which is affiliated with the Wedron Silica Co., and this building is said to be the first using this type of construction. This reinforced construction has attracted wide attention and should result in the use of brick for purposes for which it was formerly considered unsuitable.

These three bin compartments discharge to a 24-in. horizontal belt-conveyor which operates on 30-ft. centers in an underground tunnel. This conveyor discharges to a steel-inclosed bucket-elevator which operates on 40-ft. centers and discharges through a chute to the box-car loader at the old screening building.

The bin in the old storage containing glass sand (minus 30-mesh) can also discharge to an 18-in. belt-conveyor which runs on 125-ft. centers to the grinding department. The material discharged from the conveyor passes through a split chute leading to two Allis-Chalmers 6-ft. by 22-ft. tube-mills. These have granite-brick lining and use 2-

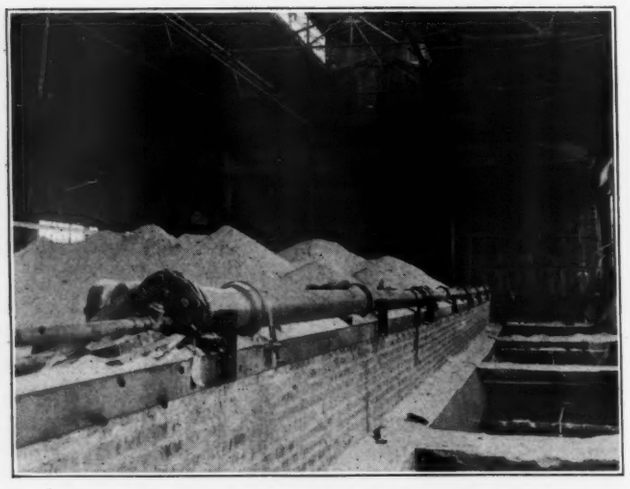
The dust-collecting system which serves both screen buildings and the dried-sand conveyor tunnel.

Operator at the bag-packer wearing a direct-pressure respirator which supplies air from outside the building.

in. to 3-in. flint pebbles imported from France. Both tube-mills supply a bucket-elevator which discharges over a Hum-mer single-deck vibrating screen having 50-mesh cloth. The material retained on the screen is chuted to waste and the fines are discharged to any one of three 40-ton conical steel bins, depending on the size of the material being ground. About 20 distinct grades of sand have been produced by these mills, the fineness being regulated by the speed of feed to the mills. Some material has been ground as fine as 98 per cent. through 300-mesh and some as coarse as 90 per cent. through 100-mesh. A Ford 2-ton chain hoist on an overhead crane is used to handle the tube-mill covers and any other heavy parts in the mill-room.

The Bates 4-bag packer can draw from any of the three bins. The valve-bags are trucked into box-cars alongside the building for shipment and their weights are checked on a Fairbanks platform scale. The bagged products are used for many purposes, including mold wash, soap manufacture, scouring compounds, pottery, enameling, dental work, etc.

A testing laboratory alongside the mill-room is well equipped to make any quality and control tests. Included in the equipment is a Tyler Ro-Tap sieve shaker. Adjoining is the bag-repair room, where bags are first cleaned in a rotary bag-cleaner having a Sturtevant fan and are then repaired on a Singer sewing-machine.



The steam-coil driers at right and drain bins at left. Overhead crane in background handles sand to driers.

As stated earlier in this text, the company has been a pioneer in many ways, including the prevention of dust as a health measure. A Sly dust-collecting system was installed when the plant was built in 1922. This was originally intended only for the grinding mills and other equipment in the mill-building but when the packer was installed it was also connected to this. This system now has two connections to each mill, one to the mill-feed bin, two to the boot of the elevator to which the mills discharge, two to the vibrating screen following the elevator in the flow, two to the top of each of the three packer feed-bins, six to the packer, three to the packer room, two to the testing laboratory, and one to the bag-mending room. This system is so efficient that each room gets a complete change of air every 2 min.

The Sly dust-collecting system installed in 1931 is of the same type. This system changes the air every 2 min. on both floors of both screen-houses and in the conveyor tunnel under the drier. It is connected in two places to each screen and has two large openings in each room and twelve connections in the tunnel. This dust-collecting unit is located alongside the screening buildings and has a No. 70 Sirocco fan. A Caldwell screw-conveyor, driven through a worm-gear speed-reducer of the same make, reclaims the dust from the collector and feeds it to the main storage elevator.

Although these dust collecting systems make the plant practically dustless, the company further insures the health and comfort of its employees by requiring that all men in the operating departments wear respirators The four men employed in the packing and bag-loading department and the man in the drier-belt tunnel wear Willson direct-pressure respirators, for which air is furnished by a compressor in the power-house. All other employees use Willson dust-type respirators.

Every other possible precaution has also been taken to insure the safety of the employees. The company is a member of the National Safety Council and has a well-trained safety organization. Posters are placed in various parts of the plant to remind employees to be careful, and the safety rules set up are rigidly enforced.

There are also locker and shower rooms. The company owns 21 houses in the village and these are rented at low rates to employees. Each employee is allowed to use all the garden space he desires on the company's property.

The power-house no longer serves this purpose, but at one time the company generated its own power with a 550-volt d.-c. steam-driven generator. Power is now purchased, although the generating unit is still in place. Alongside the generator-room is the boiler-room, which contains four 285-hp. boilers equipped with chain-grate stokers, combustion control, water-feed regulators, water-softener, etc.

In the same building is the repair shop, where all plant repair work is done. The equipment includes a lathe, drill-press, and other machinery. There is also a General Electric arc-welder and several Oxweld acetylene cutting and welding outfits. The arc-welder is connected to all parts of the plant and has proved a great money saver, as the abrasive silica sand wears out equipment very rapidly. Some of the purposes for which it is used are rebuilding bag-packer housings, feeder blades, shovel-dipper teeth, gears, etc., making drier coils and doing other work of a similar nature. Haynes Stellite is used for hard-surfacing.

Typical of the savings made with the arc-welder and Stellite are the following. According to John Dummett, plant superintendent, a bag-packer housing costs about $14.50 when new. When worn out it is rebuilt at a total cost of 75 c. for material and

(Continued on page 37)

Adequate Production and Sales Records Simplify Lime Makers' Problems

Provide Immediate Answers to Questions That Confront and Perplex Executives

By SIDNEY P. ARMSBY

SUPPOSE the board of directors were in session and wanted correct answers to the accompanying or similar questions regarding the operation of *your* plant. Would four or five clerks work all night, and then report next morning that the inventory of containers could not be completed before noon, and that no records were available on two of the questions? Or would you just make a fairly accurate guess at some of the questions and let some of the others go by default?

It is not unreasonable to imagine a sudden demand for just such diverse information regarding the operation of any lime plant in the United States, and there is no doubt that in many cases a great deal of effort would be required in order to assemble the necessary data, while in some plants such a set of questions could result in nothing more tangible than a feeling of consternation.

Every lime manufacturer realizes that today's progress or improvement is measured by yesterday's performances, but in many cases the yard-stick used for measuring is an estimate rather than a verified fact, or a long-time average instead of a day-by-day progress report. Unprofitable operations or obsolete items of equipment may be carried for months before some very obvious short-coming brings them to the attention of the management. Or, a mistake in personal judgment may lead to the supposition that some new "improvement" has resulted in a better quality product or a lower production cost, when the reverse is actually true.

Trial-and-error methods, coupled with long-time practical experience, will get results and can be made to produce high-quality lime at a profit, as has been demonstrated in many plants throughout the country. Under present-day competitive conditions, however, satisfied customers, efficient production, and adequate returns can result only from the most complete coördination of the efforts of the purchasing, sales, technical and production departments. The plant that can most quickly and economically adjust its production methods to the manufacture of products demanded by newly-created, or unexpectedly-resurrected, market conditions is the plant that will secure the new business, retain the customer that was in danger of slipping away, or show the best balance-sheet at the end of the year.

?

1 How much chemical hydrate have we shipped west of the river since January 1?

2 How much of this went to water-treating plants?

3 How many tons of bulk lime were shipped to Salesman Blank's territory last year?

4 What was our average consumption of gas per ton of lime last month, and a year ago?

5 What is our inventory of empty containers?

6 What was the highest, lowest and average percentage of core in our quicklime last February, and how has that new type burner affected core, gas consumption and daily production?

7 How closely have we held the percentage of free moisture in our special hydrate to the figure specified in the John Doe contract?

8 When was the last shipment made to The Crude Oil Co., and how was it routed?

9 What was our average calcining temperature last month and the month before?

10 How much has that new conveying equipment reduced our cost of loading quicklime?

?

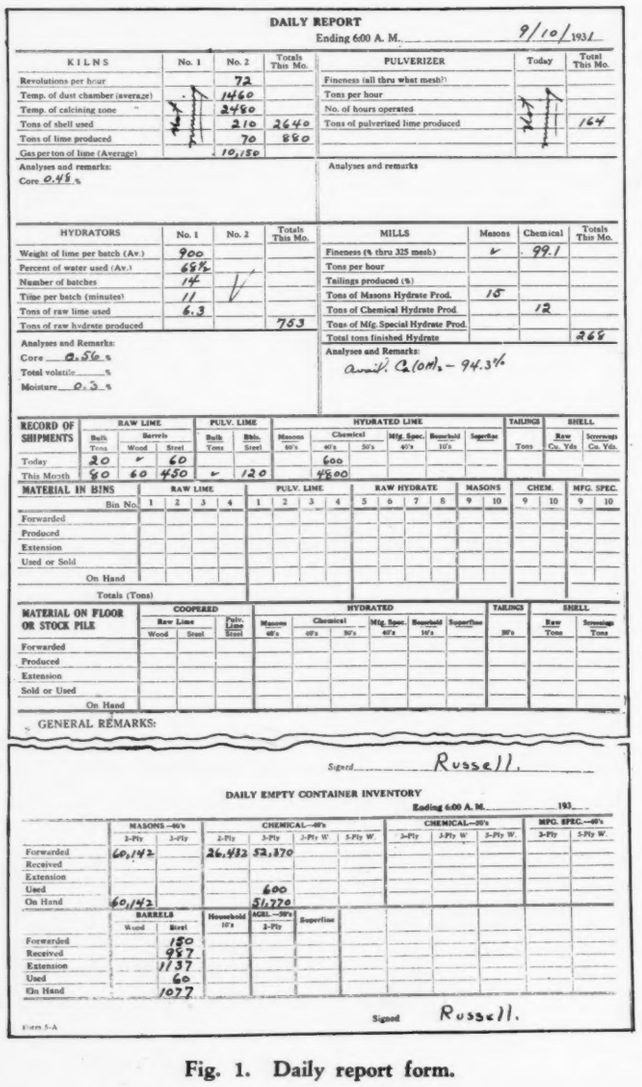
Decisions must be made quickly at times, but should not be made hastily, and the proper action can be taken by lime-company executives only after they have studied all the facts bearing on the particular case that is under consideration. And facts regarding past performances of the lime plant can be quickly secured only when detailed performance records have been accurately kept in readily-accessible form.

Where such records have been consistently kept a set of questions such as those illustrated could be answered fully and accurately by the superintendent, chemist or chief clerk within an hour or less—perhaps in time to keep the directors from voting on any more salary reductions, and certainly before the questions themselves has ceased to command interest.

Basing my discussion on the assumption that every up-to-date lime plant contains an efficiently-manned chemical laboratory, I will attempt to show: (1) that the keeping of accurate performance records is both easy and inexpensive, and (2) that a distinction can profitably be made between plant-operation records (which include only actual operating and maintenance costs) and company records (which include sales expense, overhead and all other cost items).

Obviously, if the records are to be worth-while they must cover such fundamental considerations as the quantity (and perhaps the quality) of raw material, fuel and supplies used; quantities and qualities of all grades of lime produced; production costs of each finished product; loading and shipping costs; inventories of material and supplies on hand; the date, quantity and quality of each shipment; and other items that will occur to the reader. And, above all, it is important that the records be maintained systematically, accurately and continuously.

The Daily Report.—Since continuity is vital to the success of the system, the first logical step is the preparation of a Daily Report, containing such fundamental daily operating data as will enable the technical, purchasing, sales and executive departments to obtain a day-by-day picture of just what the plant is doing. Such a report will also serve the superintendent as documentary evidence of just what took place in the plant at any given time in the past.


DAILY REPORT

Ending 6:00 A. M. 9/10/1931

KILNS	No. 1	No. 2	Totals This Mo.
Revolutions per hour		72	
Temp. of dust chamber (average)		1460	
Temp. of calcining zone "		2480	
Tons of shell used		210	2640
Tons of lime produced		70	880
Gas per ton of lime (Average)		10,150	

Analyses and remarks:
Core 0.48 %

PULVERIZER	Today	Total This Mo.
Fineness (all thru what mesh?)		
Tons per hour		
No. of hours operated		
Tons of pulverized lime produced		164

Analyses and remarks

HYDRATORS	No. 1	No. 2	Totals This Mo.
Weight of lime per batch (Av.)	900		
Percent of water used (Av.)	68%		
Number of batches	14		
Time per batch (minutes)	11		
Tons of raw lime used	6.3		
Tons of raw hydrate produced			753

Analyses and Remarks:
Core 0.56 %
Total volatile ____ %
Moisture 0.3 %

MILLS	Masons	Chemical	Totals This Mo.
Fineness (% thru 325 mesh)	✓	99.1	
Tons per hour			
Tailings produced (%)			
Tons of Masons Hydrate Prod.	15		
Tons of Chemical Hydrate Prod.		12	
Tons of Mfg. Special Hydrate Prod.			
Total tons finished Hydrate			268

Analyses and Remarks:
Avail. $Ca(OH)_2$ – 94.3%

RECORD OF SHIPMENTS	RAW LIME Bulk Tons	RAW LIME Barrels Wood	RAW LIME Barrels Steel	PULV. LIME Bulk Tons	PULV. LIME Bbls. Steel	HYDRATED LIME Masons 60's	HYDRATED LIME Chemical 60's	HYDRATED LIME Chemical 50's	HYDRATED LIME Mfg. Spec. 60's	HYDRATED LIME Household 10's	HYDRATED LIME Superfine	TAILINGS Tons	SHELL Raw Cu. Yds.	SHELL Screenings Cu. Yds.
Today	20	✓	60				600							
This Month	40	60	450	✓	120		4800							

MATERIAL IN BINS	RAW LIME 1	2	3	4	PULV. LIME 1	2	3	4	RAW HYDRATE 5	6	7	8	MASONS 9	10	CHEM. 9	10	MFG. SPEC. 9	10
Bin No.																		
Forwarded																		
Produced																		
Extension																		
Used or Sold																		
On Hand																		
Totals (Tons)																		

MATERIAL ON FLOOR OR STOCK PILE	COOPERED Raw Lime Wood	COOPERED Raw Lime Steel	COOPERED Pulv. Lime Steel	HYDRATED Masons 60's	HYDRATED Chemical 60's	HYDRATED Chemical 50's	HYDRATED Mfg. Spec. 60's	HYDRATED Household 10's	HYDRATED Superfine	TAILINGS 50's	SHELL Raw Tons	SHELL Screenings Tons
Forwarded												
Produced												
Extension												
Sold or Used												
On Hand												

GENERAL REMARKS:

Signed Russell.

DAILY EMPTY CONTAINER INVENTORY

Ending 6:00 A. M. 193..

	MASONS—60's 2-Ply	MASONS—60's 3-Ply	CHEMICAL—60's 2-Ply	CHEMICAL—60's 3-Ply	CHEMICAL—60's 3-Ply W.	CHEMICAL—60's 5-Ply W.	CHEMICAL—50's 2-Ply	CHEMICAL—50's 3-Ply W.	CHEMICAL—50's 5-Ply W.	MFG. SPEC.—60's 2-Ply	MFG. SPEC.—60's 5-Ply W.
Forwarded	60,142		26,482	52,870							
Received											
Extension											
Used				600							
On Hand	60,142			51,270							

	BARRELS Wood	BARRELS Steel	Household 10's	AGEL.—50's 2-Ply	Superfine
Forwarded		180			
Received		957			
Extension		1137			
Used		60			
On Hand		1077			

Signed Russell.

Form 5-A

Fig. 1. Daily report form.

HYDRATOR REPORT

Hydrator No. 1

	TIME AND DURATION	WEIGHT OF QUICK-LIME	% WATER	TEMPERATURE °F	CONDITION OF BATCH	REMARKS
1	2:55 – 3:27	900	68	230	OK.	
2	3:34 – 4:07	"	"	237	"	
3	3:49 – 4:22	"	"	243	"	
4	3:55 –	"	"	259	Burned	
5	"	"	70	240	OK.	
6			"	241	"	
7			"	236	"	
8			"	245	"	
9			"	240	"	
10			"	233	"	
11			"	241	"	
12			"	246	"	
13			"	240	"	
14			"	23	"	
15			"	2	"	
26						
27						
28						
29						
30						
31						
32						

Operator Black

Date 12/16/[illegible]

Gov. Analysis
Date 19
Sample taken from
Time
CO₂
O₂
CO
B. T. U. Value
Remarks
Signed

Chemical Analysis
Sample
Date
SiO₂
Fe₂O₃
Al₂O₃
CaO
MgO
Total Vol. 19
CO₂
Moist Det.
Available CaO
Calc.
Physical Analysis
Fineness (thru 325 mesh)
Rate of Slaking (to 60° F. rise)
Spec. Gr.
Wt. per Cu. Ft.
Calculated Composition
SiO₂
Fe₂O₃
Al₂O₃
MgO
CaO
Ca(OH)₂
CaCO₃
Moist
Signed

Fig. 2. Hydrator report and laboratory forms.

Fig. 1 shows the Daily Report form, on which are recorded the performance, production and fuel consumption of the kilns; the performance and production of the pulverizer; the performance, production and water consumption of the hydrators; the performance and production of the air-separators; the consumption of raw materials; analyses of the finished products; a summary of all the products shipped; and perpetual inventories of all raw materials, finished products and empty containers on hand. This is a triplicate form, approximately 8½ in. by 15 in. in size, of which one copy goes to the general manager and one to the auditor, the original being filed at the plant office. (The Empty Container Inventory may, if desired, be detached and sent to the Purchasing Department.)

The clerk who makes up this report secures the necessary data from various sources in the plant; summarizes and enters them on this form; fills in the necessary supplemental forms; and files all his reports in probably not over three hours' actual working time per day, thus testifying to the low cost of maintaining the system.

Operating Records.—Recording instruments and the operators' signed reports furnish the necessary data regarding the operation of the kilns, pulverizer, hydrators and mills and are quickly summarized and entered under the proper headings, after which the forms are filed for ready reference in case of a check-up at any future time. By adding the day's tonnage to the previous day's total the columns headed "Totals This Month" are readily kept up to date, and furnish a quick reference for monthly summaries (which will be discussed later). Information as to the quality of the various products is furnished by the control laboratory, which reports its anaylses of composite samples (or special samples if required) on the regular laboratory forms, retaining one copy of its report for its own files. Fig. 2 shows the Hydrator Report and two of the Laboratory Report forms and illustrates the fact that detailed information is always available covering the summaries which appear on the Daily Report.

Daily Shipments.—The daily record of shipments is simply a total of all orders shipped that day, individual orders being written up on a special form, which require detailed description at this point. This is a quadruplicate form, which really comprises three separate forms superimposed on one another, as shown in Fig. 3. With three carbon papers in place, the shipping clerk first writes in the car and seal numbers, the date of the order, and the specified loading. He then removes the first carbon paper; detaches the top, or Tally Sheet, and hands this to the foreman of the loading crew, who loads and tallies the car, signs and dates the sheet, and returns it to the shipping clerk for verification and filing. In the meantime what was originally the second sheet of the form has become the first sheet of a triplicate form which constitutes both Loading Order and Acknowledgment. Net loading; routing; customer's order number; consigning and invoicing instructions, and the name of the individual placing the order are written in, the detailed loading, car and seal numbers, and date of order already appearing as a carbon copy from the Tally Sheet. When the returned Tally Sheet has been verified, the Shipping Clerk fills in the date ("Date Loaded"); secures the superintendent's signature on the lowest sheet, which is an acknowledgment of the order; mails this to the customer; signs the original and duplicate Loading Orders himself; sends the duplicate to the bookkeeper; and files the original along with the Tally Sheet (after the day's total shipments have been entered on the Daily Report and on supplementary forms which will be discussed later). While the foregoing may sound somewhat involved, it is really very simple and consumes only a few minutes actual elapsed time for each order. The customer's order is formally acknowledged and he is informed whether his shipping instructions have been followed. The bookkeeper is informed that shipment has been made and is instructed just how to make out his invoice and enter the item on his books. At the same time the lime plant has a double check on the receipt and shipment of the order. This system of recording loading and shipping instructions has been found to work very smoothly and efficiently, preventing costly mistakes and facilitating the placing of responsibility for any errors that may occur.

Inventories.—Perpetual inventories are main-

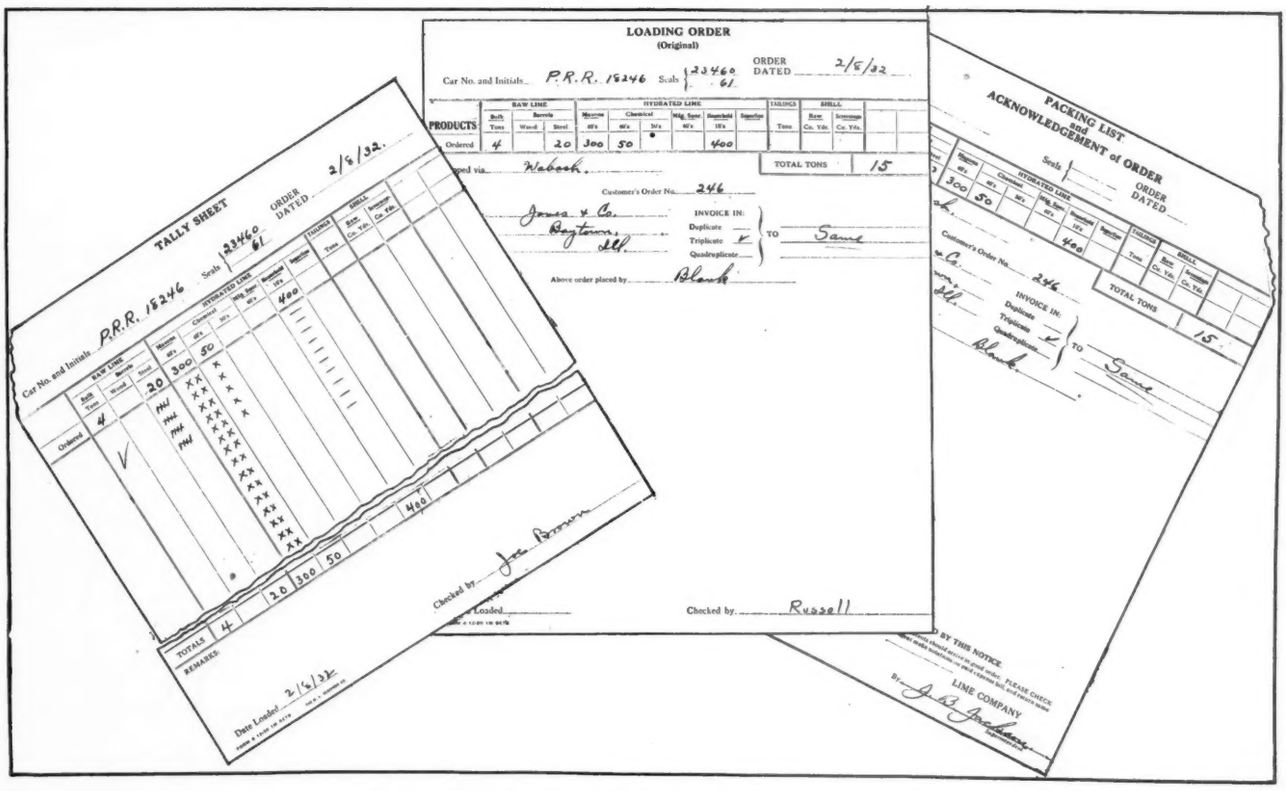
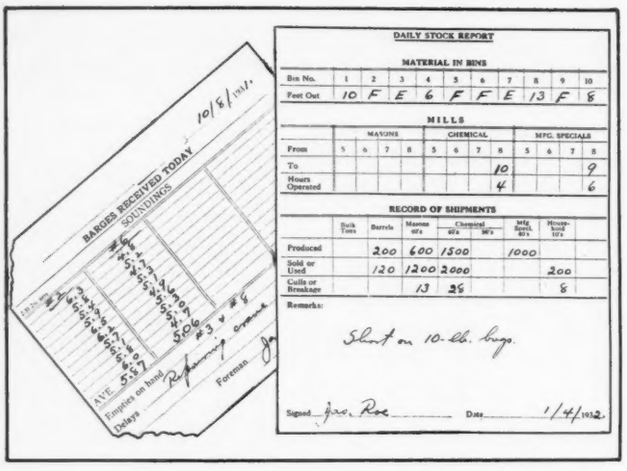


Fig. 3. Forms which furnish a daily record of shipments.



DAILY STOCK REPORT

MATERIAL IN BINS

Bin No.	1	2	3	4	5	6	7	8	9	10
Feet Out	10	F	E	6	F	F	E	13	F	8

MILLS

	Masons				Chemical				Mfg. Specials			
From	5	6	7	8	5	6	7	8	5	6	7	8
To							10					9
Hours Operated							4					6

RECORD OF SHIPMENTS

	Bulk Tons	Barrels	Masons 40's	Chemical 40's	Chemical 80's	Mfg. Specials 80's	House-hold 10's	
Produced		200	600	1500		1000		
Sold or Used		120	1200	2000			200	
Culls or Breaker			13	25			8	

Remarks: Shunt on 10-lb. bags.

Signed Jno. Roe Date 1/4/1932.

BARGES RECEIVED TODAY SOUNDINGS

10/8/1931

Empties on hand

Delays

Foreman

Fig. 4. Forms from which inventory data are obtained.

tained as shown on the Daily Report, covering raw and finished products on hand either in storage-bins, warehouse or stock-piles, and also the stock of empty containers. The value of having this information available at a glance will be readily appreciated. It facilitates ordering supplies, filling orders and routing material in the plant, and gives all departments a quick summary of conditions at any time.

Much of the information necessary for maintaining these inventories is secured from two forms which are shown in Fig. 4, and are filled in each day by one of the plant foremen. Raw material at this plant is received in barges, and the barge report serves as a record of receipts. Each column allows the entry of the name or number of one barge and the ten soundings which are taken on each cargo. Simply adding the ten readings and moving the decimal point over one place gives the average sounding. This multiplied by the length and width of the barge gives the cubic contents, which may be reported as cu. yds. or may be converted to tons by using the factor of specific gravity and moisture as determined by the laboratory. (Barge tickets are filed as a reference in case of any dispute about dates of delivery, cargo on board or any other such matter.) The other form shown in Fig. 4 covers the daily measurement of material in each bin; the raw hydrate milled, the bin from which it was drawn and the bin to which the finished hydrate was delivered; the materials shipped and the containers used or damaged in making such shipments (or deliveries to the warehouse). This Daily Stock Report must constantly check with the Daily Report, since it is obvious that if 1,600 40-lb. sacks were used and 8 sacks were broken on a certain day, the Daily Report must show a reduction of 1,608 in the count of sacks on hand and 32 tons of finished hydrate must appear as being shipped or added to the warehouse stock, while an equivalent quantity of raw hydrate must be subtracted from the previous day's stock. Or, if the mills draw from bin No. 8 for 4 hrs., producing Chemical Hydrate which is put into bin No. 10 (as illustrated by the written figures in the specimen shown), then the Daily Report must show a withdrawal of Raw Hydrate from bin No. 8 and an addition to the Chemical Hydrate in bin No. 10, as compared with the previous day's report.

Supplementary Records.—Having built up a daily record covering production, shipments, and inventories and having established detailed confirming records to support it, what additional data should be tabulated in report form? Three very obvious points requiring coverage present themselves for consideration:

(1) Operating costs, not previously mentioned, and including such items as raw material cost, labor costs, power costs, fuel and supplies, and repairs and maintenance, all being prorated to various operations.

(2) Complete shipping records, easily accessible, indexed in various ways (by cities, states, individual customers, years, etc.), and in condensed form. (The Daily Report shows only what was shipped, and it would take a long time to abstract Salesman Blank's bulk lime from a year's file of individual loading orders.)

(3) A condensed summary of the quality of all products shipped with sufficient detail to give a worth-while and easily-readable picture of the performance of the plant as a whole.

Taking these in the order listed, I shall describe briefly a few of the record forms that have been found serviceable along the lines indicated.

1. *Plant operation costs,* as distinguished from net costs of doing business, should be quickly available at any time, either for the entire plant or for any particular part of it. It may be very necessary, for instance, to know the cost of producing a ton of quicklime as compared to the cost for a ton of hydrate, of any specified grade. Or the expense

	Total Pay Roll	Manufacturing Labor																Loading and Shipping Labor											
		Raw Materials				Burning				Hydrating				Milling				Bulk Lime				Coopered Lime						Hydrated Lime			
		N. W. Crane		Other Eqpmt		Kilns		Other Eqpmt.		Hydrator		Other Eqpmt.		Mills & Collectors		Other Eqpmt		Bulk Reading	Loading in Car	Checking Car	Repairs to Eqpmt	Labor on Boxes	Filling & Sealing	Bulk Reading	Loading in Car	Checking Car	Repairs to Eqpmt	Bagging Labor	Bulk Reading	Loading in Car	Checking in Car
		Labor	Repairs	Labor	Repairs	Labor	Repairs	Labor	Repairs	Labor	Repairs	Labor	Repairs	Labor	Repairs	Labor	Repairs													
1																														
2																														
24																														
25																														
		$				$				$				$				$				$									

Fig. 5. Form designed to show pay-roll distribution.

ACME 14811-10

DATE	CAR NO. & INITIAL	MASON'S 40'S	CHEMICAL 40'S	CHEMICAL 50'S	HOUSE 10'S	COOP BBLS.	AGRL. 40'S	SPECIAL 40'S	BULK ~~TONS~~ TONS	TONS	REMARKS
9/5/31	B+O 24732							600		12	Moist. 0.65%
10/2	J.C. 6436				200	10		500		12	" 0.52 "
10/20	S.P. 27841							600		12	" 0.83 "
11/4	M.P. 10384		50					600		13	" 1.10 "
11/22	" 2597							600		12	" 0.46 "
12/10	C+O 24236					20		500		12	" 0.60 "
12/20	J.&H. 3842							600		12	" 0.52 "
	TOTALS		50		200	30		4000		85	

NAME John Doe v. Co. CITY Smithville STATE Indiana SALESMAN Blank

CITY Smithville STATE Indiana YEAR 1931 TONS 217

CUSTOMER	MASON'S 40'S	CHEMICAL 40'S	CHEMICAL 50'S	HOUSEHOLD 10'S	COOPERED BBLS.	AGRL. 40'S	MFRS. SPECIAL 40'S	BULK TONS		TONS	REMARKS
John Doe v Co		50		200	30		4000			85	
Roe Lbr. Co	3600			2000	120	600				108	
Smith Merc. Co.	600							12		24	
TOTALS	4200	50		2200	150	600	4000	12		217	

CITY Smithville STATE Indiana YEAR 1931

Fig. 6 (top) which records shipments to individual customer and Fig. 7 (bottom) which shows shipments to individual town.

of handling a ton of raw material by one method as compared to some other method. Or it may be very important to have an accurate answer to a question such as the one listed as No. 10. No system of cost-accounting can foresee every possible question that may be asked in the future, but it is possible to maintain considerable detailed information relative to operating costs by the proper prorating of various items of expense and the systematic recording of such proration.

Raw materials, fuel and supplies, and repair parts are easily accounted for, and the distribution of these items is a simple matter of bookkeeping.

Power distribution should be made on the basis of developed horsepower and actual operating time for each group of equipment which it is desired to segregate. A 30-hp. motor on a batch hydrator may develop only 15 hp. under normal operation, while other motors operated at the same time may be overloaded or underloaded according to circumstances. The logical way to arrive at a figure for power proration is to time and meter each group of equipment for a test period—say a month—of actual operation so as to determine the average power consumption per hour for the group as a whole when in operation. After a fair hourly average has been determined, it is only necessary to keep a record of the number of hours each group operates during the month; multiply the time by the established average for each group, and determine the percentage of the whole that is represented by each one, prorating the month's power bill on this percentage basis. By this means the equipment used in burning, hydrating, milling, or any other operation may be charged up each month with its fair share of the total power bill.

Labor distribution should be made to the same groups as the power distribution, as well as to any other subdivisions desired, such as maintenance of grounds, repairs to railroad track, new construction, etc. Many ways will be found to accomplish this result, a portion of a systematic Pay-roll Distribution form being shown in Fig. 5 merely as an illustration.

By condensing both power-and labor-distribution records, and keeping them in some such consistent way as that indicated, it is possible for both the bookkeeping and operating departments to have a constant and detailed record of operating expenses at all times.

2. *Shipping records* are always important and are constantly in demand for reference. The sales manager may want a detailed report of the situation in a given territory at a certain time in order to plan more effective sales campaigns. The general manager may want to know why a certain railroad was favored with the business of a particular customer, or he may require immediate information as to the tonnage shipped during a given period. A salesman may use the long-distance telephone to

inquire about a certain shipment which has not been delivered. Even the car number of a given shipment may be a matter of vital importance, and answers are wanted quickly to all questions that arise.

Easy accessibility of rather detailed information in condensed form should be the key-note when establishing any system of recording shipments, and a number of schemes have been used successfully. Of these the following is representative, having been found especially satisfactory when used in connection with the other printed forms described in this article. For easy accessibility the record is kept on visible-card files, indexed at the bottom and kept in cabinets holding six or eight trays each. Fig. 6 shows the form used in keeping a record of current shipments to individual customers. Any shipment to John Doe during the current year is recorded on this card, the date, car number and cargo being copied from the original Loading Order shown in Fig. 3 before that record is filed, and the proper salesman's name being inserted on the indexing margin as shown in the illustration.

Below each group of customers in a given town is inserted one of the cards shown in Fig. 7, only the lower, or index, margin being filled in until the end of the year. This card is of a different color from the customers' cards, and so serves as an excellent index of cities, all the cards above "Smithville" being those for the customers in that city (until the next index card is reached).

At the end of the year each customer's card is totalled; the customer's name and total shipments entered (as illustrated) on the index cards; those cards are totalled, and the upper margins are filled in to form a permanent record of the grand total products shipped to that particular city during a given year. The customers' cards are then filed, either alphabetically or by cities, in a box file and the completed index (or total) cards are filed by cities and states in a separate tray file, a complete new set of both customer and index cards being made out and inserted in the trays of the "current" file as fast as new shipments are made. The next year these index cards replace the old ones, which are then placed in a box file, where their upper margin summary allows easy indexing by means of clipped-on tabs.

Thus, a rather complete record of current shipments is always at hand, with up-to-the-minute details, and is supplemented by a full summary of last year's shipments and details of each shipment as far back as the record goes. The record is comprehensive, occupies a small space, is easily maintained, and answers a multitude of questions about past shipments quickly and accurately.

3. *Quality, or performance, records* are always essential and serve many purposes in the modern lime plant, which is producing a material that finds such a variety of applications in the fields of agriculture, construction and chemistry. Definite manufacturing standards of quality must be set up for

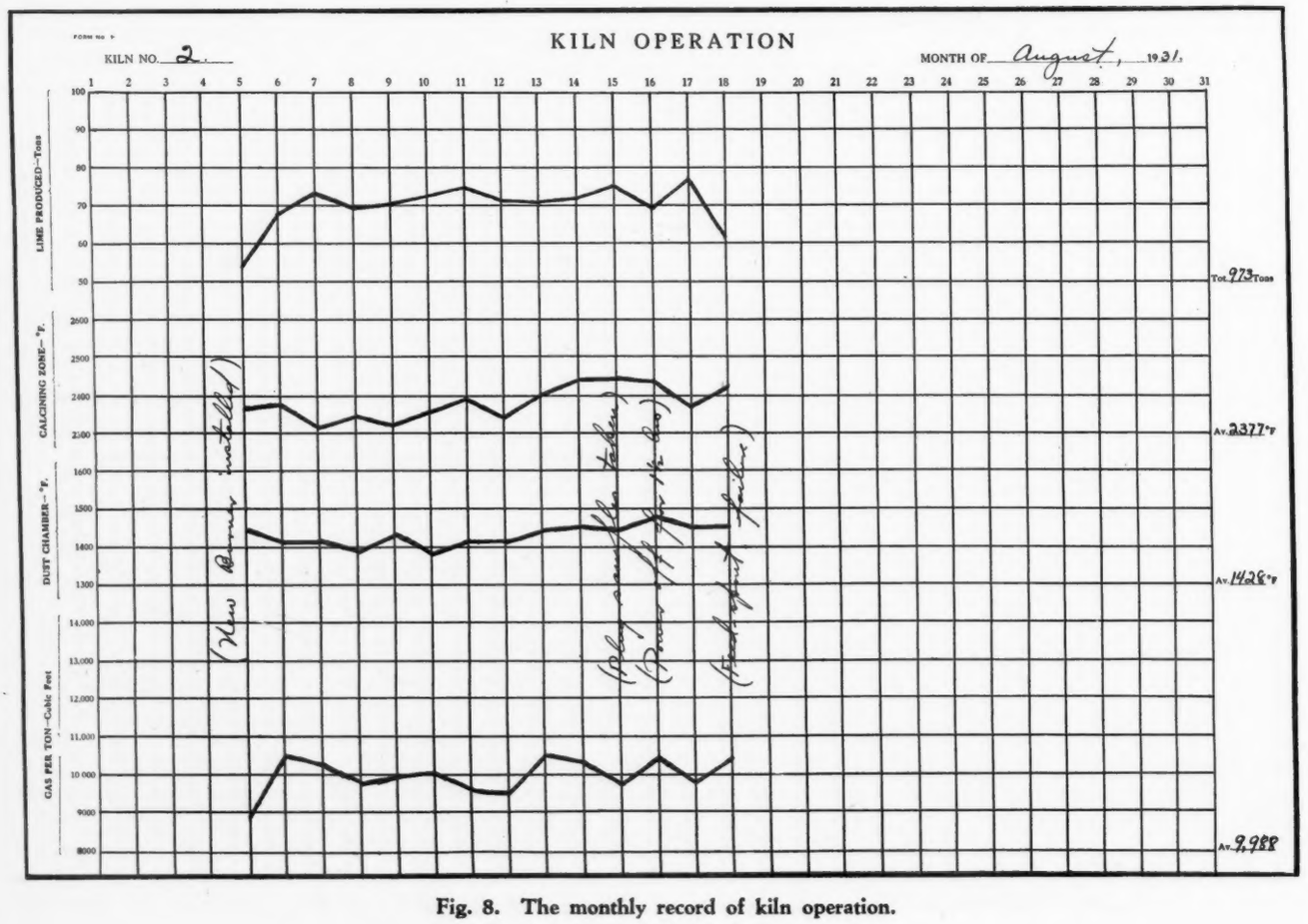


Fig. 8. The monthly record of kiln operation.

various grades of lime, and it is important that each day's products be properly graded. Lime contracts are executed on a guarantee basis, with sometimes very rigid specifications, and it is necessary to maintain complete records of the quality of all the shipments made on such contracts. New industrial processes may require lime of a very definite composition and uniform quality, and past records may show at a glance that one of your products is exactly suited for this use, while another is not. Only a verified record can show whether your plant has improved its products during any given period of time to meet the demands of the industries you have served.

Of course, the record is contained in the filed analyses of the chemical laboratory, and these should always be kept for purposes of detailed reference. It is advisable, however, to have the more important data summarized and quickly available for daily, weekly or monthly comparison, and I have found that this can be done most effectively and economically by the use of "progress reports," which are in graph form and of convenient size for display as wall charts. The charts employed for this purpose are too large to be satisfactorily reproduced in complete form here, but the principles involved are illustrated by the portion of the Kiln Operation chart shown in Fig. 8.

In addition to the data shown on the reproduced portion, this chart also shows a daily graph of the carbon-dioxide, oxygen and carbon-monoxide content of the stack gas, and the percentage of calcium carbonate and both total and available calcium oxide in the quicklime produced, the monthly averages of each of these being posted at the right of the chart in the manner shown. These charts may, of course, be of any size desired, but need seldom be more than about 18 in. by 24 in. in area, and should be printed on a good-quality paper so as to allow folding and filing in an ordinary box file.

Similar charts, covering other important data, are used as follows:

1. *Quicklime Sold,* showing daily fluctuations of each constituent determined by chemical analysis, and also daily settling rates.

2. *Hydrator Operation,* showing tons of hydrate produced; pounds of quicklime used per batch; percentage of water used; time of agitation of daily batches; temperatures inside the hydrator; and the percentages of core ($CaCO_3$), free moisture and/or free lime in the raw hydrate produced.

3. *Chemical Hydrate Sold,* showing complete analyses of daily shipments, including fineness and settling rate tests, and also the type or grade of raw hydrate that was used to produce the finished hydrate.

Charts of the same general type may be designed to cover many other features of the daily work of the plant, their desirability and make-up being indicated by local conditions. Only a few minutes a day is required to post the data from the previous day's reports, and the day-by-day progress of the solid lines across the face of the charts is not only interesting and informative, but also a definite factor in encouraging every possible effort that may result in the improvement of quality and the reduction of operating costs. Their psychological effect alone may be worth many times the cost of maintenance.

Answering the Questions.—Having installed such a system of record-keeping as has been discussed in the foregoing paragraphs, let us return to the hypothetical directors' meeting and see if we are in a position to make quick and accurate reports covering the ten questions asked at the beginning of this article. The answers to the questions follow:

Question 1.—All towns "west of the river" to which shipments have been made since January 1 will be quickly located on the visible tabs of the "Index Cards" (see Fig. 7) in the current shipping record trays. Above each of these are the individual customers' cards (see Fig. 6) for that particular town, and an adding machine will quickly tell us how much chemical hydrate has been shipped to these customers up to date, either in 40- or 50-lb. sacks, or both.

Question 2.—The use of a second adding machine and a selection of the proper customer cards will give the answer to this question at the same time as the answer to No. 1.

Question 3.—A similar procedure will secure this information, by totalling the bulk-lime columns on all customer cards in Mr. Blank's territory.

Question 4.—Simply refer to the monthly charts of Kiln Operation for the months demanded.

Question 5.—The general manager has this on his copy of the Daily Report (see Fig. 1), correct up to 6 o'clock this morning.

Question 6.—The Kiln Operation chart for last February answers the first part of the question, and the rest is revealed by a brief comparison of the charts for a month or two before and after the date of installation of the new burner.

Question 7.—If the contract in question is a large one, a special set of charts will have been kept to cover it. Otherwise the data will appear on the regular chart for Chemical Hydrate Sold or in the filed analyses of the laboratory.

Question 8.—A glance at the Crude Oil Company's card in the tray file shows the date of the shipment, and the filed original of the Loading Order for that date shows the routing.

Question 9.—Refer again to the Kiln Operation charts.

Question 10.—Refer to the Pay-roll Distribution sheets for the periods preceding and following the installation of the new conveyor.

After receiving such complete and prompt replies to their various requests for detailed information, the board of directors will undoubtedly bring its meeting to a close with a feeling of satisfaction because its members are convinced that the plant is being operated systematically and efficiently, and that every department chief and sub-chief is at all times fully informed as to just what his department or unit is doing to promote the welfare of the organization as a whole.

A general view of Plant No. 2 and quarry of A. H. George Stone Co. at Glenwood, Ind. Truck in center hauls stone to skip-hopper feeding car which discharges at plant.

Indiana Crushed-Stone Plants Rebuilt To Meet Present Specifications

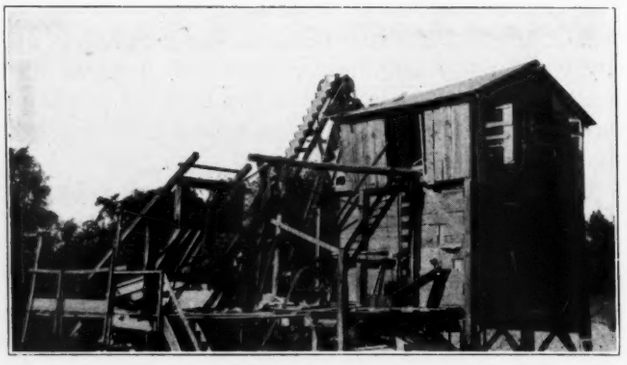
Road Stone and Agricultural Limestone Shipped by Truck for Local Consumption

THE A. H. George Stone Co., New Salem, Ind., during the past summer remodeled both its crushed-stone plants so that materials to meet any specifications can now be supplied. Both these plants ship by truck only and cater to a local trade, furnishing road materials for state and county highway work and agricultural limestone to the farmers in the vicinity. Previous to last summer only one of these plants was operated at a time and part of the equipment was moved back and forth between the plants. The demand during the past season, however, was so great that it became necessary to equip both plants fully so that they could be operated simultaneously.

The original plant, No. 1, was built in 1925 and is located just south of Andersonville, Ind., on state road No. 52. Drilling at this deposit is done with jackhammers and the air is furnished by a Chicago Pneumatic air-compressor in the plant. The stone is loaded by hand into 1½-cu.yd. quarry cars which are pushed by man-power to the incline leading to the plant. Light tracks are used so that they can be shifted readily. A Domestic single-drum hoist hauls the cars one at a time up the incline to the plant, where they are discharged into the No. 5 Telsmith primary gyratory crusher. The crushed material drops to a Telsmith 24-in. heavy-duty bucket-elevator operating on 35-ft. centers. This feeds it to a 40-in. by 15-ft. heavy-duty Telsmith rotary screen which has 5 sections with ¾-, 1-, 1½-, 2½-, and 3½-in. perforations and a sand jacket with ¼-in. perforations.

The five sizes produced go direct to bin storage from which they are loaded into trucks through bottom-discharge gates. The oversize, 3¼-in. plus, is chuted to a No. 3 Allis-Chalmers Gates gyratory reduction crusher and is returned by a small elevator to the main elevator for rescreening. The plant was originally driven through a series of belts, pulleys, line-shafts and chain by a steam engine. When the changes were made to the plant last summer, this engine was replaced by a 60-hp.

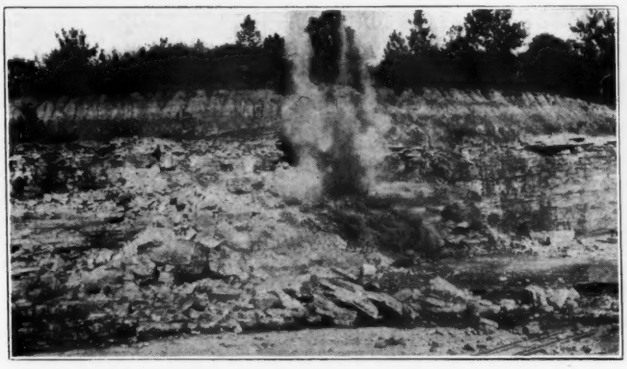
A general view of Plant No. 1 and quarry near Andersonville, Ind. Cars are loaded and hauled up incline to plant.



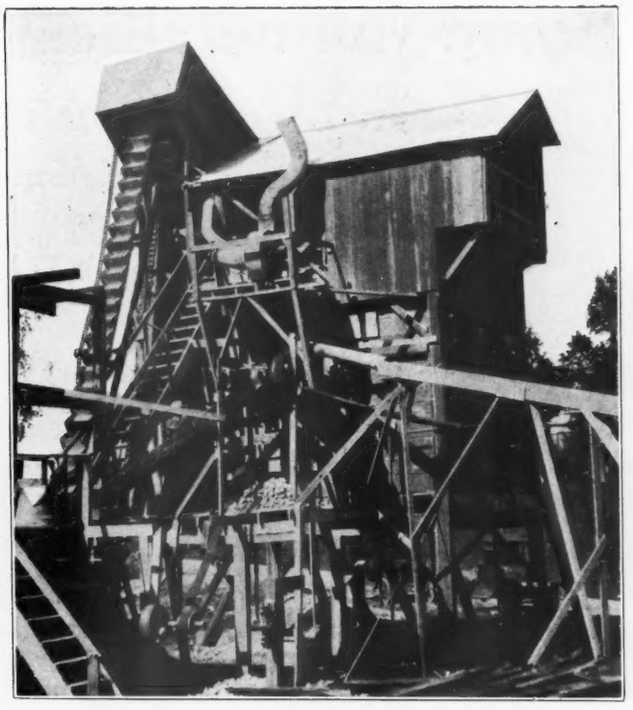
Plant No. 1, showing top of incline leading from quarry with primary crusher and bucket-elevator leading to screen.

Rumely Oil-Pull tractor which furnishes ample power to drive the entire plant. An 8-in. Goulds centrifugal pump is used for quarry drainage.

The plant originally consisted only of the primary crusher, the rotary screen, a bucket-elevator and the bins. The changes made included the replacement of the elevator with a heavier and longer unit, the addition of a 4-ft. section to the rotary screen, and the installation of the secondary crusher and the second elevator. These changes were made without disturbing the arrangement of the original equipment.

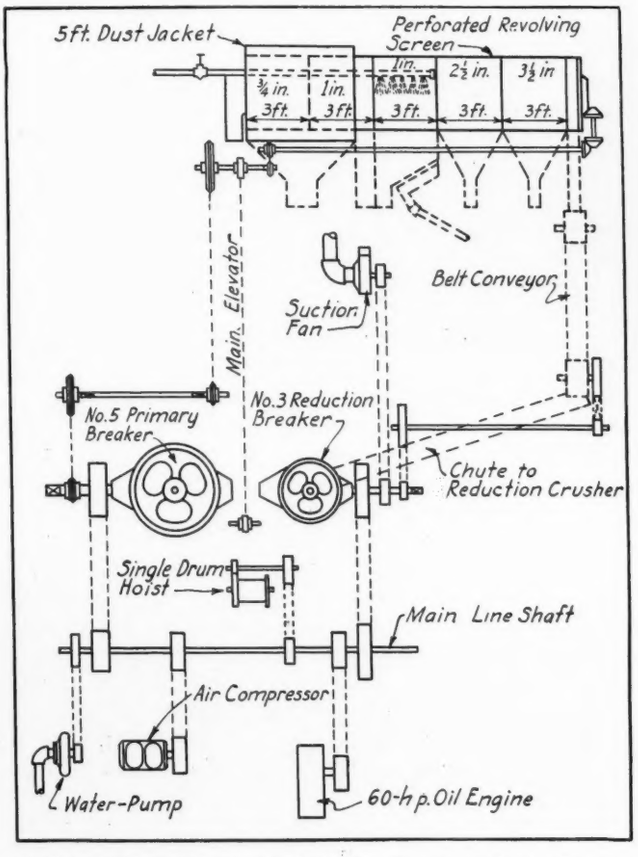


A blast in the quarry at Plant No. 1. Skip car and tractor in right foreground. Use of light tractor allows cars to be moved readily.



Plant No. 2 showing elevator leading from primary crusher to screen, blower which removes fine dust, and belt-conveyor leading to reduction crusher.

Plant No. 2 is located at Gray's Falls, 6 mi. southeast of Glenwood, Ind. This plant is almost a duplicate of Plant No. 1 except for the arrangement of the equipment. Plant No. 2 was built in 1928. The deposit here comes almost to the surface, so very little stripping is necessary. Drilling is done with jackhammers and the stone is loaded by hand into 1-ton dump trucks. These haul it to the foot of an incline, where they dump from an elevated platform into a single quarry car. This is drawn up the incline to the plant by a Clyde single-drum hoist and is dumped into the No. 5 Allis-Chalmers Gates primary gyratory crusher.



Sketch showing lay-out of Plant No. 2 and method of power transmission from a single internal-combustion engine.

Left to right: Ed Murphey, quarry boss; A. H. George, president and manager; Stella Grey, secretary and treasurer; A. W. Knox, consulting engineer; Wyatt Bell, chief engineer; and Jerry Marshall, chief mechanic.

The crusher discharges to the main bucket-elevator which feeds the 40-in. by 15-ft. Telsmith revolving screen. This has five 3-ft. sections with ¾-, 1-, 1-, 2½-, and 3½-in. perforations and an outer jacket with ¼-in. openings. As will be noted in the accompanying drawing, there is a water spray in the third section of this screen and both this and the second sections have the same size openings. This arrangement allows the coarse rock

(Continued on page 40)

Some Nonmetallic-Mineral Producers Face Serious Financial Problems

Seek Relief from Excessive Burden of Fixed Charges on Their Corporate Debt

By E. JAY COMER

President, Refinance Corporation

IN the aggregates business, as in practically all lines of industrial endeavor, the great majority of executives controlling the destinies of the producing companies are to-day, and have been at various times during the past few years, faced with serious financial problems. In the main these problems pertain to the fixed charges on their funded indebtednesses and on land-purchase contracts or leases which were entered into in the predepression era and at that time did not appear to hold the slightest prospect of future menace to the companies' welfare. These firms are in urgent need of an escape that is not based upon receivership and the liquidation of assets. In the first place the security for an industrial loan is predicated upon the value of the properties upon an earning basis, as brick and mortar or, in the case of the aggregates business, sand-and-gravel, stone or other deposits. Such security, in the event of liquidation, may have merely a nominal value. Secondly, in receivership equities of great potential value may be completely wiped out with resultant disaster to the stockholders and the management. Aside from the practical certainty of monetary loss to senior- and junior-security holders alike, there is also to be considered the economic loss to the community and ofttimes to the nation involved in the disappearance of a unit in what is, perhaps, a basic industry. What then is the "new deal" for industrial executives and their creditors, the bondholders and land-owners whose land is under purchase contract?

Financially speaking, industrial executives may be divided into two classes: (1) Those who have been content to drift with the tide in the hope that some reversal of general conditions will land them eventually on a friendly shore; and (2) those who have struck out courageously against the tide and whose initiative has been rewarded by the comfortable feeling that, come what may, they are in a position to weather the storm and to take the fullest advantage of the better times which lie ahead. The first group is represented in the aggregates business by those who now exist by the grace of bondholders' committees, or committees representing some other group of creditors, or who live in constant apprehension of some similar existence. The second is represented by that relatively-small company of executives who have not waited the sounding of the death knell by the bondholders' or creditors' committees, but who have manfully faced the situation and are now hopefully awaiting the turn of the business trend.

In the aggregates business the attention of executives everywhere has been centered during the past few years on the necessity for reducing all operating expenses as much as possible. Comparatively few, however, have attempted any readjustment of what in the final analysis is a much greater menace to their corporate well-being, *i.e.*, the fixed charges on their funded debt and/or on land-purchase contracts or leases. To-day even the suggestion that relief from these charges is possible is likely to meet with an incredulous query as to what new miracle can unfix a fixed charge and it is to these unbelievers particularly that these remarks are addressed. The majority of investment bankers, who originally underwrote the issues, have taken no pains to point a way out, and, of course, it is too much to expect that the bondholders themselves or the holders of the contracts for the sale of mineral-bearing lands would be interested in advancing a program of relief for their debtors. Because of the unquestioned fact, however, that the average creditor, be he bondholder or landowner, is well aware of present difficulties—and in truth in the great majority of cases has some of his own which he is not shouting of from the house tops—it has been proved that, far from adopting an attitude of exacting his pound of flesh, he can be shown that his corporation in an equitable plan of readjustment holds far greater possibilities for him than by attempting, through any action at law or otherwise, to enforce his claims.

For what normally is the security for a bond issue on a nonmetallic-mineral company? Land known to contain deposits of such aggregates convertible into a saleable product. And what is the security for a land-purchase contract? The land itself. What then can the bondholder obtain by the adoption of a noncoöperative stand? He can, through becoming a party to a bondholders' protective committee pay his share of such committee expenses and of the legal and receivership fees incident to a foreclosure of the mortgage of which he holds a part. Following this he may become part owner of a nonmetallic-mineral business, let us say, but what actually has he obtained through such action? Can it be expected that he or the group of bondholders, of which he is one, can more profitably operate a business which experienced management has found it unprofitable to operate? Can the investment bankers, who normally sponsor such protective committees, operate such a concern more profitably than men of perhaps life-time experience in conducting such a business? And in the case of

the owner whose land is under purchase contract, what can he hope to obtain by a nonconciliatory attitude? Perhaps, after long-drawn and costly proceedings, he may obtain his land, something which he might well obtain much more quickly and certainly in a less costly fashion by friendly and cooperative action.

What then is the solution for such industrial companies? The answer in the writer's opinion is to be found in a return to the fundamental principle of the debtor approaching his creditor with a full and complete statement of the facts in the case. Let it be shown, and this should not be difficult, that an honest effort has been made to meet fixed obligations but that conditions beyond the debtor's control have made this no longer possible. Let an equitable program be presented for the creditor's consideration and let it be couched in understandable language. Let the bondholders' or land owners' full coöperation be solicited both by correspondence and by personal call. If the creditor be a bondholder, permit him to see that his coöperation will react to his own benefit and that the plan has not been formulated solely for the advantage of junior-security holders. Inform him fully what sacrifices, if any, the other classes of security holders are making. See to it that his priority of position in the event of liquidation is not disturbed and that any lenience or concession he is asked for now will be repaid in some manner upon the return of normal business and earnings. Do these things and do them directly and the coöperation of any class of creditors in an equitable plan is assured of success.

True, neither the average industrial executive nor his organization is qualified by training or experience properly to prepare an appropriate plan; as a matter of fact it is perhaps advisable that an outside viewpoint be obtained on the situation, so that the various equities can be recognized in an impartial way. Again it is advisable that an organization versed in meeting security holders be retained to contact such holders as may not respond to communications from the debtor company itself. In brief, the necessary factors are: (1) The creation of a plan which by its evident fairness will merit the coöperation of the creditors, and (2) its consummation by an agency having a thorough knowledge of the debtor's attitude to the creditor and a complete understanding of the security holder's position. The former is obtainable by an analysis of the debtor's past and present operations and earnings and an intelligent review of the trust indenture or other instrument evidencing the debt. The second is possible only through the retention of an experienced organization having particular knowledge of the various plans of bondholders' protective committees and the public's lack of sympathy with, and reluctance to coöperate in, many of the obviously-unfair plans proposed by such committees.

So that the solution proposed may be illustrated the writer is taking the liberty of citing the case of a company in the aggregates business because this concern's aggressive action in the matter of the readjustment of its financial structure has resulted so satisfactorily for the company and its creditors. Many executives in similar situations would have thrown up their hands in despair, sacrificed their interest in potentially-valuable properties, and allowed their creditors to salvage a pitiable remnant of their investment. Not so this progressive group. Working in coöperation with a financial organization, an equitable plan was prepared and submitted to the creditors representing some $950,000 of funded debt and land-purchase contracts. Within a period of 60 days the company's fixed obligations for the current year were reduced from $151,000 to $25,300, and the further payment of principal and interest extended for terms sufficient to eliminate the imposition of any burden on the company pending the return of normal business activity in its field. In the meantime a sinking fund has been provided and through this a substantial percentage of the net earnings of the company, if any, are earmarked for the redemption of these obligations which, with the full coöperation of the holders, have been successfully readjusted.

Wedron Silica *(From page 26)*

labor, and the rebuilt housing lasts twice as long as a new one. The packer feeder blades formerly lasted only 1 or 2 days. When rebuilt with Stellite, they last from 2 to 3 weeks. The manganese-steel dipper teeth cost about $6.50 new and formerly had to be replaced every month. These are now rebuilt with Stellite at a total cost of 50 c. and now last 3 or 4 months under the same conditions. Recently a gear was broken and considerable delay to the operations would have resulted while a new one was being ordered. Two teeth were built into this gear at a cost of about $1 and as a result, this gear, which cost $14 originally, is as good as new.

With a few minor exceptions the motors in the plant were furnished by the General Electric Co. When in full operation, the plant uses a total of 500 hp. of electric motors and carries a 90-per cent. power factor. When the synchronous motor-generator set, which generates 550-v. d.-c. energy for the crane motor in the drain-room is in operation, however, the power-factor increases to 98 per cent.

Each of the tube-mills is driven by a 125-hp. motor through a flat belt. The Bates packer is Texrope-driven by a 25-hp. motor. All the belt-conveyors are belt-driven from lineshafts, except the one feeding the Jigger screens and the packer-spill conveyor, which are driven through Jones worm-gear speed-reducers and the conveyor feeding the mills, which is belt-driven by a separate motor. All the elevators are Texrope- and gear-driven by individual motors, except the mill-discharge elevator, which is driven through a Foote worm-gear speed-reducer. The conveyor and elevator belting was furnished by the Quaker City Rubber Co., and the conveyors and elevators by the Stephens-Adamson Mfg. Co.

The main office of the Wedron Silica Co. is at 38 So. Dearborn St., Chicago, Ill. R. Fitzgerald is chairman of the board and treasurer; A. Warsaw is president, general manager and sales manager; and N. H. Crissey is secretary.

Tower System of Storage and Reclamation Used in Michigan Gravel Plant

Drag-Scrapers Used to Excavate Deposit and to Give Added Storage for Product

TO the commercial world the state of Michigan means that part of the state lying east of Lake Michigan. This section, with its many diversified industries, makes the state one of the largest manufacturing centers of the country. The Upper Peninsula of Michigan, however, is, except for the production of iron ore, more noted for its hunting, fishing, and other sports, and is largely dependent upon tourist traffic for its income. Good concrete, black-top and gravel roads give access to all parts of the upper peninsula and most of the aggregates for these are furnished from the glacial deposits of gravel which abound in this part of the country.

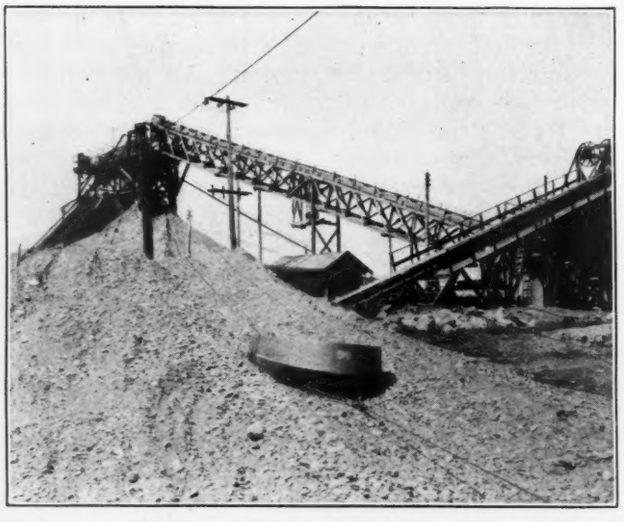
The largest producer of aggregates in this section is the Champion Gravel Co., of Iron Mountain, Mich., which operates four plants. This company built its first plant at Champion. Its second plant, at Loretto, was erected in 1921. A third plant was built at Pound, Wis., but was not operated in 1932 and may be abandoned. The fourth plant, that with which this article is particularly concerned, is the one built late in 1929 at Beechwood, Mich. This plant was one of the first in which the Kern tower system of storage was used. It has a capacity of 80 tons per hr. and can produce and ship this amount of material with a force of only 4 men in addition to the superintendent. When not producing gravel, 2 men can load from storage into cars or trucks at a rate that averages at least 100 tons per hr.

Out-door sub-station, hoist-house and drag-scraper reclaiming from deposits in background.

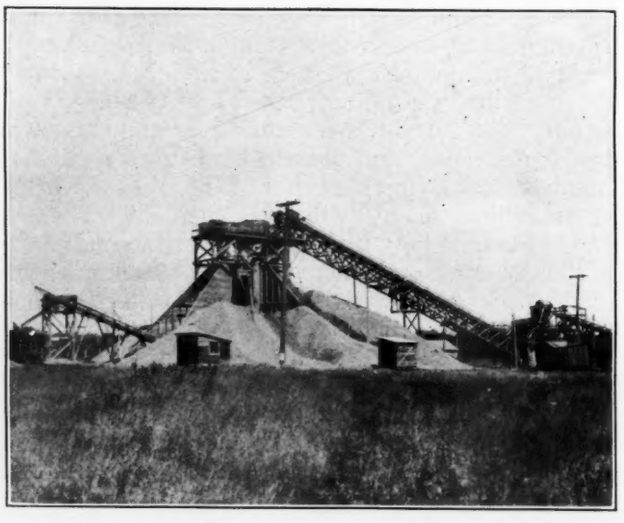
The property on which the plant is located lies 8 mi. west of Iron River on State Highway No. 2 and on the Iron Mountain-Watersmeet branch of the C. & N. W. Ry. The property of 25 acres has an overburden of clay, which is about 2 ft. in depth and is removed every spring with the drag-scraper used in the pit. The depth of the gravel deposit is not known but operations have been carried to a depth of 52 ft. without encountering any variation in the quality of the material. The water-level is about 17 ft. below the surface. At a depth of about 25 ft. there occurs a layer of large boulders bonded together by clay, but with this exception the gravel runs from 25 to 50 per cent. sand. There is very little gravel over 6 in. in size.

The gravel is excavated from the pit by a 1-cu.yd. Sauerman Crescent scraper working on a 75-ft. span. It is operated in the usual manner by swinging the tail pulley in a circle about the discharge point. In this way the bank is caved into the pit and the underwater handling of the material removes most of the clay and other foreign matter before the material reaches the plant. The scraper is operated by a Kern 2-drum variable-speed hoist which is driven by a 50-hp. Allis-Chalmers electric motor through a Falk flexible coupling.

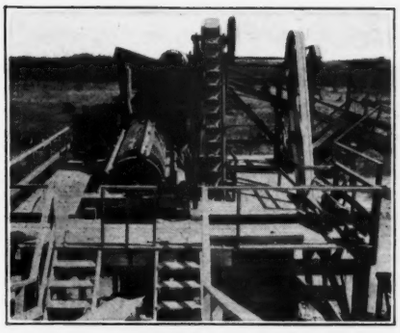
The scraper discharges into a timber hopper from which the



Half cu.yd. drag-scraper reclaiming material to live storage for loading out through central tower.

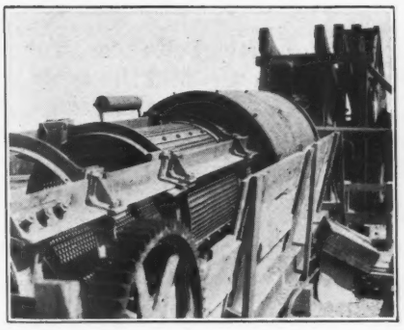


Loading conveyor (left), storage-scraper hoist-house (foreground), scalping and crushing equipment (right).



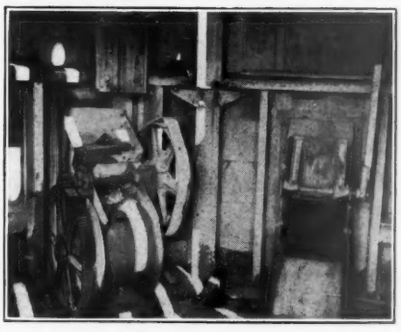
Revolving scalping screen and elevator from crushers.

Gyratory crusher and elevator feeding scalping screen.

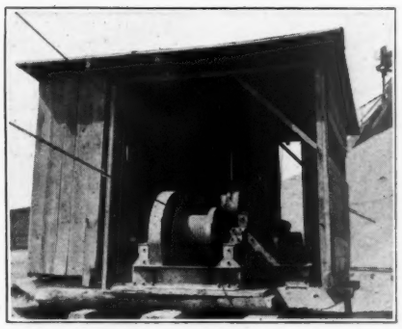


Revolving sizing screen and the rollers used to prevent blinding.

material is carried by a Telsmith plate feeder to a 24-in. inclined belt-conveyor operating on 120-ft. centers. This discharges to a 48-in. by 12-ft. Telsmith revolving scalping screen which has 2¼-in. round perforations. The oversize material is chuted to an 8A Telsmith gyratory crusher which is set at 2-in. opening and discharges its product to a 14-in. belt-bucket elevator that runs on 30-ft. centers and feeds the material back to the scalping screen. The crusher is belt-driven by a 40-hp. General Electric motor, and a belt from the crusher shaft operates the head pulley of the elevator. A Chain-Belt chain drive from the elevator shaft drives the scalping screen and a belt drives the conveyor that runs from the pit. A. W. A. Jones friction clutch allows the conveyor to be stopped at any time so that the crusher can be cleared. The feeder underneath the pit hopper is chain-driven from the tail pulley of the same pit belt-conveyor.



Two of feed openings in tower. Revolving gravel feeder at left and sand gate at right.



Two-drum variable-speed hoist which operates drag-scraper in pit.

All the material passing through the scalping screen goes to a 20-in. inclined belt-conveyor which runs on 150-ft. centers to the top of the screening and storage building and is gear-driven by a 10-hp. Allis-Chalmers motor. It discharges the gravel to the 40-in. by 18-ft. Telsmith revolving sizing screen. This has a 2-ft. scrubber section and ¾-in. and ½-in. openings on its main barrel and an 8-ft. sand jacket with ¼-in. slots. A section with 1½-in. openings is sometimes added to this screen. The sand goes to a Telsmith settling-tank which discharges it to storage. The four sizes of gravel also go to storage. Water is added at the sizing screen and this washing results in a product clean enough to pass the most stringent specifications. The water and silt from the settling-tank is flumed to a waste-pond. The sizing screen has Timken roller-bearings and is gear-driven by a 15-hp. General Electric motor.

The storage system consists of 7 radial compartments, two of which are used for concrete sand, two for road gravel, and one for each of the other three gravel sizes. A 2-drum Kern hoist, mounted on a car having a wooden inclosure, operates a Sauerman ½-cu.yd. drag-scraper which gives additional storage capacity. This car operates on a narrow-gage track laid on a radius of about 65-ft. about the plant. The hoist is driven by a 25-hp. Allis-Chalmers motor that receives its power through a flexible cable which is plugged in at any of several outlets.

The stored material is reclaimed from the piles for loading through 7 outlets through the inner retaining wall which forms the core of the tower system and which supports the weight of the screening plant. Gravel is fed through 5 of these outlets by revolving feeders, each one of which is belt-and-gear-driven by a 1-hp. Allis-Chalmers motor. Sand is fed through 2 lever-operated segmental gates. Single or mixed sizes are fed from storage to a 20-in. inclined loading belt-conveyor which operates on 76-ft. centers. This is gear driven by a 5-hp. motor and loads either cars or trucks for shipment. Most of the product of the plant is used for various types of highway construction and maintenance and most shipments are by rail.

Electric current is received at 6,900 v. from the lines of the Wisconsin-Michigan Power Co. and is reduced to 440 v. at an outdoor substation at the plant. Water for washing purposes is pumped from an abandoned section of the pit by an Allis-Chalmers pump driven by a 30-hp. Allis-Chalmers motor. Most of the electrical equipment in the plant is of Allis-Chalmers manufacture.

The plant was designed and built under the supervision of the Fred T. Kern Co., which also supplied most of the equipment. Screens, crusher, gates, sand-classifier, and other equipment were furnished by the Smith Engineering Co. Chain-Belt Rex Stearns conveyor idlers and pulleys and

New York Rubber Co. Cameo conveyor belting are used. All drive belts were furnished by the New York Rubber Co. and the cable for the drag-scrapers by the A. Leschen & Sons Rope Co.

The main office of the Champion Gravel Co. is at 107 E. A St., Iron Mountain, Mich. The company's officers are: M. J. Bacco, president and general manager; J. J. Bacco, vice-president; and W. W. Thompson, secretary and treasurer. E. C. Dams is superintendent of the Beechwood plant. This company is also affiliated with the Service & Supply Co., material dealer in Iron Mountain.

Fuel Savers (From page 22)

centage can probably be realized by improvement in the coal equipment.

Combining all these savings—the product of the remaining percentages, not the addition of the savings—indicates that it is entirely within the realm of reason to expect, with a combination of already well-known equipment, to obtain fuel rates on wet-process kilns of less than 60 lb. of coal per bbl. of cement.

The results indicated for filters alone check actual practice. The results for the others separately—and also when combined, except for the filters—check actual practice. It is, therefore, logical to believe that the results indicated for the combination of them all would also be checked, if put into actual practice.

Conclusions.—The fact that fuel rates as indicated above are possible is not sufficient ground in itself for the installation of all the equipment, or even a part of it, because in many cases the lowest fuel rate possible will not be the most economical one.

In many locations the cost of fuel is so low that the installation of any of the equipment discussed would not save enough in dollars and cents to justify the expense.

In other cases the nature of the raw materials may be such that the cost of slurry filters is too great to pay a reasonable return upon the investment in them.

Some raw materials are such that chains or lifters can not be used successfully, due to the continual formation of mud-rings, which would cause too much mechanical trouble to make them worth while.

The existing kiln may be of sufficient length to allow the satisfactory operation of heat exchangers, and so make the cost of replacement by longer kilns uneconomical.

In short, each individual case must be studied by itself, careful tests and calculations made, and only such equipment installed as will prove economical as an investment.

The study here made of the possibilities of various "fuel-savers" for wet-process kilns, however, indicates quite clearly that a combination of the various items of equipment already in use would give fuel rates much lower than any now obtained and lower, perhaps, than are even thought possible by many.

George Stone (From page 35)

to be washed after it has gone dry over the dust jacket and the second screen section. The water and fine material are washed through the third section and drop on a stationary screen fitted with ¼-in. wire cloth. Any oversize material is thus saved and deposited in the bin and the wash-water and silt are flumed to waste. A No. 7 suction fan takes out the very fine dust that comes through the dust jacket. These precautions are taken to furnish very clean rock for state black-top roads.

The four sizes produced go direct to bin storage and are loaded into trucks through bottom-discharge gates. The oversize from the screen, 3½-in. plus, is fed to a short belt-conveyor which discharges it through a chute into the No. 3 Telsmith gyratory reduction crusher. The crusher feeds the material back to the main elevator for rescreening.

The power for this plant is furnished by a 60-hp. oil engine driving through belts and chains. A Gardner 6-in. by 6-in. air-compressor furnishes air for quarry drilling and an 8-in. Fairbanks-Morse centrifugal pump is used to drain the quarry and to supply wash-water. Truck shipments are weighed on a 15-ton Fairbanks scale.

Originally cars were used exclusively in the quarry of plant No. 2, but this method proved impractical when the haul lengthened, 20 trucks were substituted. The latter were found more economical as their use saved the cost of moving the tracks before and after every blast. This plant also originally consisted of the primary crusher, elevator, and storage-bins. The other equipment was added to give a finer and cleaner product and to increase capacity.

Each of the plants has a capacity of about 250 tons in a 10-hr. day. Both plants are so situated that they can furnish road material to three counties and the state.

All mechanical changes made during the past season at these plants were supervised by A. W. Knox, consulting engineer for the Knox Engineering Co., Indianapolis, Ind. A. H. George is the owner of the A. H. George Stone Co.

Sulphur Production in 1932

The output of sulphur in the United States in 1932 dropped to less than one-half of the quantity produced in 1931. Shipments and exports showed smaller decreases than production, and stocks were reduced.

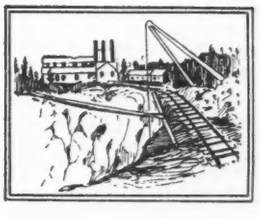
Sulphur production amounted to 889,695 long tons in 1932, a decrease of 58 per cent. compared with the output in 1931 of 2,128,930 tons. The amount produced in 1932 was 1,669,286 tons, or 65 per cent. less than that reported in 1930, the record year. Shipments declined from 1,376,526 tons, valued at about $24,800,000 in 1931, to 1,108,-112 tons, valued at about $19,900,000 in 1932, or over 19 per cent. in both quantity and value. Stocks at the mines on Dec. 31, 1932, had decreased to 3,031,000 tons, or 219,000 tons below the record reserve at the close of the preceding year.

MEN OF THE INDUSTRY

Markham Photo

PORTER W. YETT

FOR more than 22 years Mr. Yett has been actively engaged in the production of crushed stone and sand and gravel and in the use of these products in the paving and construction fields. He was one of the first to see the possibilities in the ready-mixed-concrete field and, as a result, the firm of Swigert, Hart & Yett, Inc., Portland, Ore., of which he is general manager, in 1927 built what is said to be the first large commercial proportioning and truck-mixing plant in this country. Mr. Yett is also active in many other business and manufacturing enterprises and in association work and is a regional vice-president of the National Crushed Stone Assn.



Personal Mention

C. L. Mikesh, president of the Ottumwa Sand Co., Ottumwa, Ia., is the new president of the Ottumwa Country Club.

Dr. Harold Steiner of the chemical research department of the Riverside Cement Co., Riverside, Cal., gave a talk on the chemical analysis of Portland cement and its history before the Phi Sigma Epsilon fraternity at a recent meeting in that city.

Herbert Dahm, secretary of the West Nyack Trap Rock Co., Inc., West Nyack, N. Y., and Louis F. Miller, electrical engineer for the New York Trap Rock Corp., Newburgh, N. Y., were members of a delegation of the Rockland County Motorists Tax Relief Assn. which recently attended in Albany a conference representing over 750,000 motorists of the state. The purpose of the conference was to protest against a proposed 1 c. emergency gasoline tax and the imposition of an added 1 c. tax.

George A. Mattison, Jr., vice-president and general manager of the Woodstock Slag Corp., of Birmingham, Ala., has assumed the duties of president of the Birmingham Traffic and Transportation Club.

Howard B. Carpenter, district superintendent for the Republic Steel Corp., has been elected president of the Lake Erie Limestone Co., Youngstown, O., a partly-owned subsidiary of the steel company, succeeding H. W. Heedy. He also succeeds B. F. Fairless, Republic vice-president, as a director. Other directors of the Lake Erie Limestone Co. are: H. W. Heedy, W. M. Andrews, W. P. Snyder, Jr., and George L. Collard.

Carl Erdman, superintendent of the plant of the Lone Star Cement Co., New York, Inc., Hudson, N. Y., has been made superintendent of the Lone Star Cement Co., Ind., Inc., plant at Limedale, Ind. John Nordvig, superintendent at Limedale has been transferred to Hudson.

H. Houghton Lauer, for thirteen years chief engineer of the Atlas Portland Cement Co. and for the past three years assistant chief engineer of the Universal Atlas Cement Co., has resigned to go into consulting engineering work. He will specialize in reports and valuations of mining and industrial properties, and the design, construction and remodeling of cement and other industrial plants. Mr. Lauer has had broad engineering, operating and construction experience in cement and steel plants, coal and metal mining, railroad and municipal work in the United States and in Mexico. He has opened an office at 41 East 42 St., New York, N. Y.

L. F. DeHarporte has been granted a permanent permit to operate a quarry and crushing plant in the San Gabriel Canyon near Los Angeles, Cal., by the Los Angeles County supervisors. The action ended a controversy of three years' standing, during which time the plant has been operating under a temporary permit.

Bert S. Keller has been made sales manager of the Riverside Lime & Stone Co., Chicago, Ill. He was formerly with the Dolese & Shepard Co.

G. H. F. Johannes was recently elected president and treasurer of the Glencoe Lime & Cement Co., St. Louis, Mo. He succeeds the late E. S. Healey.

Cadwallader Jones, one of the organizers of the Woodstock Slag Corp. of Birmingham, Ala., died at Birmingham recently. He was 61 years of age and had retired from the slag business which he helped organize 13 years ago.

George E. Warren, former assistant general manager of the Portland Cement Assn., has been appointed vice-president and manager of the eastern operations for the Southwestern Portland Cement Co. with headquarters at Osborn, O. Mr. Warren graduated from the University of Illinois in 1912 and joined the association in 1921. Since 1932 he had been in charge of the association's work on the Pacific Coast.

Obituary

John T. Crozier, 53, superintendent of the plant of the Western Limestone Co. at Weeping Water, Neb., for 12 years and more recently president of the Independent Crushed Stone Co. at the same place, died recently after an illness of four weeks. Mr. Crozier was mayor of Weeping Water at the time of his death.

Morris Kind, 59, president of the Hercules Cement Corp., died recently at his home in Bryn Mawr, Pa. He graduated from the University of Pennsylvania in 1896 and practiced engineering for a number of years. In 1917 he helped to organize the company of which he later became president.

Charles W. Ziegler, a quarry worker for the Susquehanna Stone Co., died recently from injuries received when he fell 50 ft. from the roof of a building at the company's plant at Wrightsville, Pa.

H. G. Barnhurst, 60, died of heart failure in his sleep March 18, 1933, at the home of W. A. Skinner, Chicago representative of the Babcock & Wilcox Co. He had been for 29 years with the same organization in the Fuller Engineering Co., the Fuller-Lehigh Co., and its successor the Babcock & Wilcox Co. At one time Mr. Barnhurst was successively engineer for the Lehigh Portland Cement Co. He was later associated with the staff of Cornell University, afterwards superintendent of the Diamond Portland Cement Co., chief engineer of the Fuller Engineering Co., advisory engineer of the Fuller-Lehigh Co. and, at the time of his death, was connected with the cement sales department of the Babcock & Wilcox Co. Mr. Barnhurst was one of the pioneers in the manufacturing of equipment for cement plants and was widely known in the industry. He was responsible for much of the pioneering work in the pulverizing of coal and had obtained a number of patents connected with the cement industry. The funeral was held from his home at 94 Groton St., Forest Hills, L. I., N. Y. He is survived by his widow and three children.

Coming Events

April 12-13, 1933. Chicago, Ill. Eleventh Annual Midwest Safety Conference, Stevens Hotel. W. H. Cameron, managing director, 20 North Wacker Drive, Chicago, Ill.

May 23-24, 1933. Atlantic City, N. J. Fifteenth Annual Convention, National Lime Assn., Ambassador Hotel. Norman G. Hough, pres. and gen. mgr., 927 15th St. N. W., Washington, D. C.

June 25-30, 1933. Chicago, Ill. Sixth Midwest Engineering and Power Exposition. Chicago Coliseum. G. E. Pfisterer, director, 308 W. Washington St., Chicago, Ill.

June 26-30, 1933. Chicago, Ill. Annual meeting, American Society for Testing Materials, Stevens Hotel. C. L. Warwick, secretary-treasurer, 1315 Spruce St., Philadelphia, Pa.

Latest Portland-Cement Statistics

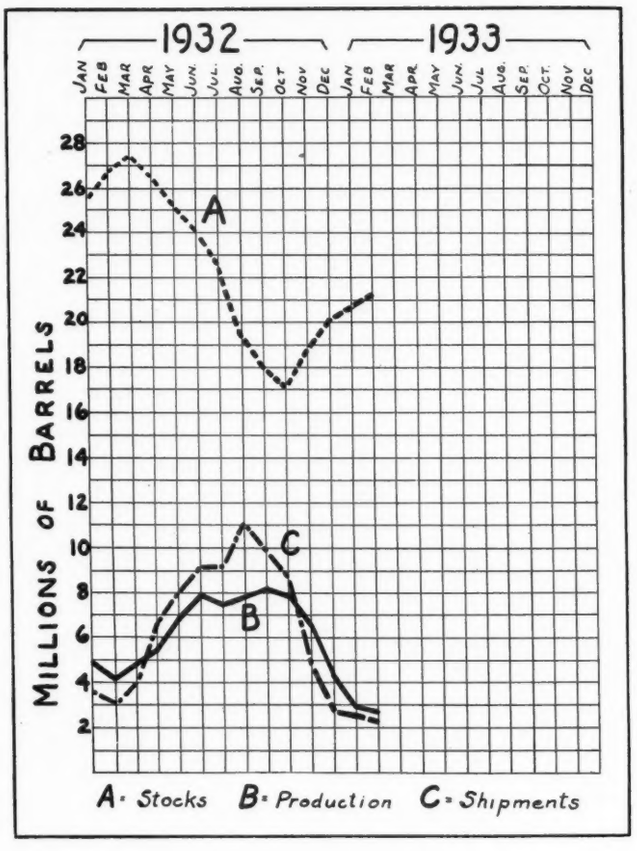


Chart showing monthly production, shipments and stocks on hand at end of month, from January, 1932, to February, 1933

THE Portland-cement industry in February, 1933, produced 2,772,000 bbl. of cement, shipped 2,275,000 bbl. from the mills, and had in stock at the end of the month 21,121,000 bbl. Production of Portland cement in February, 1933, showed a decrease of 30.2 per cent. and shipments a decrease of 27.0 per cent., as compared with February, 1932. Portland-cement stocks at the mills were 20.8 per cent. lower than a year ago. The statistics here given are compiled from reports for February received by the Bureau of Mines from all manufacturing plants except four, for which estimates have been included in lieu of actual returns.

DISTRIBUTION OF CEMENT[1]

Shipped to—	January (*a*)		February (*a*)		Year	
	1932	1933	1932	1933	1931 (*b*)	1932 (*c*)
Alabama	29,065	65,810	27,589	44,645	1,250,778	390,650
Alaska	132	.....	0	.....	12,169	11,282
Arizona	12,426	5,758	8,383	6,404	438,135	161,178
Arkansas	19,588	28,702	22,280	20,009	1,223,213	269,539
California	371,260	248,865	301,852	300,772	6,616,135	4,671,688
Colorado	13,598	10,805	18,392	28,097	775,540	492,411
Connecticut	37,618	26,209	24,687	15,195	1,476,613	806,700
Delaware	13,150	8,899	12,842	3,544	347,423	297,838
Dist. of Columbia	59,606	76,511	70,548	63,020	1,249,676	1,068,936
Florida	27,586	35,070	27,805	38,447	764,671	427,078
Georgia	100,950	92,250	92,049	63,004	1,714,033	1,132,281
Hawaii	16,983	12,946	15,765	18,175	267,334	237,443
Idaho	2,359	2,524	2,987	3,157	189,317	94,380
Illinois	103,901	71,367	108,880	115,629	7,925,435	5,822,358
Indiana	48,366	37,033	60,561	29,925	3,880,234	3,000,507
Iowa	22,943	22,087	20,162	27,479	3,799,665	2,591,364
Kansas	27,495	55,891	36,309	50,436	2,131,790	1,044,149
Kentucky	44,852	30,128	47,017	29,884	1,628,002	1,369,978
Louisiana	77,633	93,341	62,045	45,045	3,906,467	1,286,474
Maine	6,347	3,893	4,513	5,164	527,376	409,620
Maryland	87,662	35,046	57,752	27,201	2,013,929	1,558,894
Massachusetts	87,756	28,508	67,952	36,663	3,043,584	2,124,238
Michigan	92,394	38,780	96,588	28,049	5,582,116	3,428,358
Minnesota	31,018	7,518	26,585	36,103	3,716,068	3,146,044
Mississippi	14,040	27,456	11,977	20,639	524,804	466,696
Missouri	77,383	72,845	85,579	62,781	4,259,370	3,453,258
Montana	3,494	6,082	3,062	5,377	263,119	149,958
Nebraska	6,897	10,799	11,655	18,787	1,903,200	770,941
Nevada	10,308	54,662	12,238	25,640	133,403	628,978
New Hampshire	7,667	4,512	4,638	4,187	437,493	266,377
New Jersey	165,341	92,250	127,933	74,419	5,065,654	2,849,559
New Mexico	6,292	10,604	14,749	10,675	264,507	173,803
New York	590,166	299,193	469,466	186,135	19,755,653	11,045,374
North Carolina	37,779	20,527	36,507	25,735	1,015,225	448,328
North Dakota	942	3,041	1,395	3,640	258,072	175,877
Ohio	161,775	82,682	174,750	79,452	6,644,895	4,702,382
Oklahoma	81,230	105,220	90,606	122,392	2,213,685	1,237,440
Oregon	26,097	17,283	26,001	13,731	926,874	522,764
Pennsylvania	251,407	156,684	224,349	148,368	7,922,885	4,703,269
Porto Rico	2,725	2,588	1,751	3,315	67,675	55,253
Rhode Island	22,151	5,636	8,594	4,455	569,817	305,267
South Carolina	33,652	7,520	30,897	14,063	2,250,646	367,581
South Dakota	3,721	7,068	3,503	6,580	637,023	333,934
Tennessee	36,629	38,976	36,126	34,645	1,396,425	1,165,781
Texas	255,469	286,316	285,206	202,585	5,684,691	3,959,368
Utah	6,730	3,281	6,402	2,341	311,212	165,558
Vermont	2,937	2,259	4,618	1,439	312,492	259,355
Virginia	64,365	34,550	57,936	42,103	1,596,041	903,508
Washington	45,904	18,587	45,674	23,426	2,086,795	1,288,582
West Virginia	45,752	32,661	47,007	35,426	1,421,369	858,436
Wisconsin	54,214	22,811	46,973	18,124	3,977,652	2,950,491
Wyoming	1,261	3,008	2,553	6,896	136,273	83,010
Unspecified	15,671	6,802	0	0	235,182	99,437
	3,367,187	2,473,844	3,085,688	2,233,403	126,751,835	80,233,953
Foreign countries	25,813	28,156	32,312	44,597	398,699	345,047
Total shipped from cement plants	3,393,000	2,502,000	3,118,000	2,278,000	127,150,534	80,579,000

a Includes estimated distribution of shipments from 3 mills each month.
b Final figures.
c Compiled from monthly reports of the producers; includes estimated distribution of shipments from 2 to 4 mills each month, and some revisions.

RATIO OF PRODUCTION TO CAPACITY (*165 plants*)

	February		January	December	November
	1932	1933	1933	1932	1932
The month	18.7	13.4	12.9	18.5	29.1
The 12 months ended	45.2	27.1	27.6	28.3	29.0

PRODUCTION AND STOCKS OF CLINKER BY MONTHS, IN 1931 AND 1932 (*thousands of barrels*)

Month	Production		Stocks End of Month		Month	Production		Stocks End of Month	
	1932	1933	1932	1933		1932	1933	1932	1933
January	6,107	3,036	8,184	6,092	July	6,613	.....	7,889	.....
February	5,176	3,105	9,375	6,422	August	7,078	.....	7,175	.....
March	5,443	.....	10,025	.....	September	7,703	.....	6,708	.....
April	5,924	.....	10,511	.....	October	7,259	.....	6,093	.....
May	6,273	.....	9,922	.....	November	6,290	.....	5,938	.....
June	6,803	.....	8,877	.....	December	4,335	.....	5,995	.....

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1931 AND 1932 (*thousands of barrels*)

Month	Production		Shipments		Stocks at End of Month	
	1932	1933	1932	1933	1932	1933
January	5,026	2,958	3,393	2,502	25,778	20,624
February	3,971	2,772	3,118	2,275	26,657	21,121
March	4,847	.....	3,973	.....	27,545	.....
April	5,478	.....	6,536	.....	26,496	.....
May	6,913	.....	8,020	.....	25,394	.....
June	7,921	.....	9,264	.....	24,043	.....
July	7,659	.....	9,218	.....	22,512	.....
August	7,835	.....	10,968	.....	19,398	.....
September	8,210	.....	9,729	.....	17,878	.....
October	7,939	.....	8,743	.....	17,084	.....
November	6,462	.....	4,782	.....	18,788	.....
December	4,248	.....	2,835	.....	20,200	.....
Totals	76,509	.....	80,579	.....	.....	.....

PRODUCTION AND STOCKS OF CLINKER, BY DISTRICTS, in FEBRUARY, 1932 and 1933 (*thousands of barrels*)

District	Production		Stocks at end of Month	
	1932	1933	1932	1933
Eastern Pa., N. J., and Md	1,531	556	1,155	703
New York and Maine	443	217	722	425
Ohio, Western Pa., and W. Va	426	238	1,116	487
Michigan	200	118	817	834
Wis., Ill., Ind., and Ky	904	363	1,111	534
Va., Tenn., Ala., Ga., Fla., and La	314	397	808	408
Eastern Mo., Ia., Minn., and S. Dak	341	359	414	438
W. Mo., Neb., Kan., Okla., and Ark	320	260	807	498
Texas	219	219	239	202
Colo., Mont., Utah, Wyo., and Idaho	35	0	190	339
California	408	378	1,623	1,322
Oreg. and Wash	35	0	373	232
Totals	5,176	3,105	9,375	6,422

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN FEBRUARY, 1932 AND 1933, AND STOCKS IN JANUARY, 1933 (*thousands of barrels*)

District	February						Stocks at End of January
	Production		Shipments		Stocks at End of Month		
	1932	1933	1932	1933	1932	1933	1933
Eastern Pa., N. J., and Md	1,315	449	851	403	5,706	1,645	3,599
New York and Maine	319	184	166	88	1,575	1,625	1,529
Ohio, Western Pa., and W. Va	215	166	284	190	3,405	3,006	3,029
Michigan	114	85	121	48	2,093	1,567	1,529
Wis., Ill., Ind., and Ky	515	319	249	148	3,386	2,804	2,633
Va., Tenn., Ala., Ga., Fla., and La	290	436	359	335	1,749	1,597	1,497
Eastern Mo., Ia., Minn., and S. Dak	358	328	150	154	3,726	2,557	2,383
W. Mo., Neb., Kan., Okla., and Ark	179	195	239	246	1,942	1,687	1,738
Texas	280	197	256	203	847	639	646
Colo., Mont., Utah, Wyo., and Idaho	7	0	38	61	456	385	446
California	316	390	343	365	1,124	1,065	1,040
Oreg. and Wash	63	23	62	34	648	544	555
Totals	3,971	2,772	3,118	2,275	26,657	21,121	20,624

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1931 AND 1932

Month	Exports				Imports			
	1932		1933		1932		1933	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
January	36,704	$82,984	26,790	$50,281	14,375	$16,648	59,380	$45,851
February	12,889	39,350	.....	.....	83,707	69,197	.....	.....
March	39,105	81,856	.....	.....	19,173	17,215	.....	.....
April	30,123	69,451	.....	.....	59,392	40,999	.....	.....
May	31,634	71,048	.....	.....	9,223	7,358	.....	.....
June	33,134	72,084	.....	.....	19,962	14,715	.....	.....
July	18,972	54,814	.....	.....	31,519	24,904	.....	.....
August	25,110	48,961	.....	.....	76,407	55,710	.....	.....
September	35,270	63,018	.....	.....	68,220	49,754	.....	.....
October	28,756	52,922	.....	.....	59,769	40,380	.....	.....
November	57,811	98,187	.....	.....	11,692	7,414	.....	.....
December	25,073	67,530	.....	.....	9,057	6,739	.....	.....
Totals	374,581	$802,205	.....	.....	462,496	$351,033	.....	.....

Drug Stores of 80's Sold Portland Cement

Modern drug stores derive much of their business from the sale of articles that are not drugs at all. One of their important items of a half-century ago, however, is not sold over the counters today. That item is Portland cement.

According to Aman Moore, now engaged in the design, and financing of cement plants at Los Angeles, the Portland-cement salesman of the late 1880's sold practically all the commodity to druggists, to be dispensed at retain in 1-, 5-, and 10-lb. quantities in bulk. Natural cement was used almost entirely for construction purposes before the turn of the nineteenth century, Portland being a comparatively new product without general acceptance, except for household use, patching cracks in cellar walls, chimneys, etc.

Mr. Moore, who has designed and built a number of Pacific Coast Portland-cement plants, obtained his start in the industry as one of its pioneer salesmen in the Middle West. Much of the Portland cement then sold in the United States was shipped in from Germany, Mr. Moore recalls, the product being shipped and sold in oak barrels weighing 400 lb. gross. The barrel itself, a wooden-hooped affair, weighed 24 lb., giving the buyer 376 lb. net. The standard still exists today, although the barrel as a package has long since been discarded, a ¼-bbl. sack of 94 lb. being universally used.

Control of Bush Rock Purchased by Glasser

W. F. Glasser, for many years secretary of the firm of the R. Bush Rock & Sand Co., Los Angeles, Cal., recently acquired Mr. Bush's interests in the firm and is now its sole owner. The name of the company has been changed to W. F. Glasser, Inc. The company's quarry and plant are located in Santa Ynez Canyon near Santa Monica, Cal., its crushing facilities having been augmented last year by the acquisition of the crushing plant erected by the Alphonse Bell interests in anticipation of the establishment of a plant to crush rock for cement making. The Bell plan would have crushed and pulverized the stone on the site, piping the powdered rock in the form of a slurry down to the Pacific Ocean to be loaded on barges and shipped down the coast to be burned into cement. Property owners blocked the proposed plant, however, and Mr. Glasser was fortunate in being able to purchase the crushing plant for a nominal sum.

Bayles and Colleagues Head Glens Falls Again

At the recent annual meeting of the Glens Falls Portland Cement Co., Glens Falls, N. Y., all the directors were reëlected. The following officers were also reëlected: Geo. F. Bayle, Sr., president; Geo. F. Bayle, Jr., vice-president; Robert C. Carter, treasurer; Frank W. Wait, secretary.

Traffic News and Comment

Recent I. C. C. Decisions

Agricultural Limestone.—On further consideration the commission has prescribed a mileage scale of rates to apply on agricultural limestone in box-cars from Gibsonburg, O., to destinations in the southern peninsula of Michigan, with the provision that rates based on 90 per cent. of this scale shall apply on this commodity when carried in box-cars. The complaint attacked the rates under Sec. 1, 3 and 13, the undue preference allegedly being given competitors located at Sibley and Monroe, Mich. The basis for rates from Sibley and Monroe to Michigan destinations has been the Michigan scale, which provided for an arbitrary of 12 c. for a two-line haul and an arbitrary of 20 c. for a three-line haul. The complainant contended that in computing distances from Michigan producing points the various New York Central System lines were considered as one line, while in computing distances from Gibsonburg these lines were treated as separate carriers. From Gibsonburg the rates were generally computed by using either the Michigan scale or the P. S. M. 923 scale, whichever made the higher rate. The P. S. M. 923 scale was shown in PIT AND QUARRY last month under the decision on crushed stone. It carries no joint-line arbitrary. The complainant cited various decisions of the commission to show that the rates assailed were unreasonably high. Among others were the Brownell Improvement Co. case, 126 I. C. C. 414, the North American Cement Corp. case, 163 I. C. C. 701, and the Falling Spring Lime Co. case, 172 I. C. C. 783. The findings of the commission are:

(1) That the rates assailed on agricultural limestone, in bags or in bulk, in box-cars, from Gibsonburg to destinations in the Lower Peninsula of Michigan are, and for the future will be, unreasonable to the extent that they exceed, or may exceed, the scale of rates set forth in Appendix B to this report, subject to a minimum weight of 60,000 lb.

(2) That the rates assailed on agricultural limestone, in bulk, in open-top cars, from Gibsonburg to destinations in the Lower Peninsula of Michigan are, and for the future will be, unreasonable to the extent that they exceed, or may exceed, rates 90 per cent. of those under the scale of rates set forth in Appendix B hereto, subject to a minimum weight of 90 per cent. of the marked capacity of the car, except that the actual weight shall apply when the car is loaded to its full visible capacity. In computing rates under this finding, fractions shall be resolved to the nearest whole cent, dropping any fraction of one-half cent.

(3) That the rates assailed were unreasonable for application on past shipments to the extent that they exceeded those found reasonable in the original report herein.

(4) That the circumstances and conditions affecting the intrastate transportation of the traffic herein considered between points in Lower Peninsula of the state of Michigan and interstate transportation from Gibsonburg to destinations in that portion of Michigan are substantially similar; that there is competition between the complainant and the mills at Sibley and Monroe in the sale of agricultural limestone in that state; that the rates herein prescribed for interstate application to destinations in Michigan are and will be maximum reasonable rates; that the intrastate rates from Sibley and Monroe to the same destinations, to the extent that they are lower, distance considered, result and will result in undue preference and advantage of shippers in intrastate commerce and in undue prejudice and disadvantage to the complaining shipper in interstate commerce; and that said undue preference and advantage can and should be removed by the establishment of rates on agricultural limestone from Sibley and Monroe to destinations in the Lower Peninsula of Michigan which shall not be lower for corresponding distances than those hereinbefore prescribed from Gibsonburg to the same destinations. We will enter no order at this time in respect to the intrastate rates but will leave to the state commission and the carriers the matter of adjusting those rates so that they will harmonize with the interstate rates herein approved.

(5) That in determining reasonable rates, either on past movement of the traffic considered in this case or for future application on such traffic, the distances over the shortest routes over which car-load traffic can be moved without transfer of lading shall be used, and the lines of the carriers subject to the control of the New York Central hereinbefore named shall be treated as a single line.

(6) That to the rates herein prescribed for application on and after Jan. 4, 1932, may be added the present authorized emergency charges.

Finding No. 7 allows reparation on past shipments. The original report referred to in finding 3 is reported in 152 I. C. C. 429. The scale prescribed and shown in Appendix B is shown below. I. C. C. Docket No. 20,039, National Mortar & Supply Company *v.* Ann Arbor *et al.*

APPENDIX B

Miles	Single	Joint
20	$ .65	$ .75
30	.75	.85
40	.85	.95
50	.95	1.05
60	1.05	1.15
70	1.15	1.25
80	1.20	1.30
90	1.25	1.35
100	1.30	1.35
120	1.40	1.40
140	1.45	1.45
160	1.50	1.50
180	1.55	1.55
200	1.60	1.60
220	1.65	1.65
240	1.70	1.70
260	1.75	1.75
280	1.80	1.80
300	1.85	1.85
320	1.90	1.90
340	1.95	1.95
360	2.00	2.00
380	2.05	2.05
400	2.10	2.10

Agricultural Lime.—The commission after reconsideration has affirmed the finding in the original report in 186 I. C. C. 124, that the rates on agricultural lime from Berkeley, W. Va., to Virginia destinations were unreasonable. I. C. C.—Docket No. 24,456, Bone Dry Fertilizer Co., Inc. *v.* A. C. L. *et al.*

Cement.—In response to fourth-section applications No. 14,501 and No. 14,791 authority has been granted to depart from the long- and-short-haul clause of the fourth section, subject to the usual circuity limitations, in establishing and maintaining rates of 10½ c. on cement from Linwood, Ia., to Chicago, Ill., and points in the Chicago District; 12 c. from Linwood, Ia., to St. Louis, Mo.; 8½ c. from Hannibal (Ilasco), Mo., to St. Louis, Mo.; 9½ c. from Marquette, Mo., to St. Louis, Mo.; maintaining higher rates at intermediate points subject to the following provisions: (1) that the rates from intermediate points shall not exceed the rates from Linwood, Hannibal (Ilasco) and Marquette, respectively, to the above destinations; (2) that the rates, from, to and between intermediate points shall not exceed the scale prescribed or approved in Atlas Portland Cement Co. *v.* C. B. & Q., 81 I. C. C. 1 and 83 I. C. C. 80, or Western Cement Rates, 48 I. C. C. 201 and 52 I. C. C. 225, as the case may be, or the lowest combination of rates subject to the act.—I. C. C. F. S. O. No. 11,185.

Crushed Stone.—The commission finds that the carriers have justified the proposed reduced rates on crushed stone from Greencastle and Limedale, Ind., to Maroa, Ill., and the suspension order has been vacated and the proceeding discontinued in I. C. C. I. & S. Docket No. 3,790.

Ground Limestone.—Relief from the long-and-short-haul clause of the fourth section has been granted in connection with the rates on marl from Falling Spring, Va., to destinations in the south. This relief is granted in a second supplemental order including marl in the relief granted on the rates on ground limestone in a modification of the original report in 186 I. C. C. 316. This is in response to fourth section application No. 14,349.—I. C. C. F. S. O. No. 10,595.

Fifteen-Per Cent. Case, 1931.—The carriers have been given permission by the federal commission to publish on short notice tariffs continuing the emergency charges authorized in 178 I. C. C. 539 and 179 I. C. C. 215, except on ore and concentrates until Sept. 30, 1933. Only one surcharge of 6 c. per ton may be charged on lake cargo coal. The emergency charges as such are to terminate Sept. 30, 1933. The report says in part:

It is evident that the surcharge plan, as a temporary emergency measure, although productive of some net increase in revenue, falls far short of solving the problem of credit now confronting the railroads generally. Continuation of the surcharge without limitation, or condition would be equivalent to a general increase in freight rates. This clearly is not justified on the present record. The problems with which the railroads are confronted to-day can not be solved by general increases in freight rates. Certainly any substantial increase would result in permanent injury to the railroads. Their low earnings are not the result of low rates. The present relation between commodity prices and freight rates was discussed upon the record to some extent but that general question will be presented in another proceeding at an early date and can not be determined here.

In our original report herein, under the heading of The Railroad Future, we discussed certain matters of utmost importance to the future of the railroads. We wish again to emphasize the recommendations which we there made. Giving due weight to all the surrounding circumstances and conditions, and to the evidence presented in this record, as reöpened, we are of the opinion that the surcharges, as such, should be brought to an end, but that a reasonable period should be allowed during which the respondents will have an opportunity to file tariffs in the usual way, proposing such readjustments in their rates, in the light of the impending discontinuance of the surcharges, as they feel they can justify. We will, therefore, permit blanket tariffs to become effective on short notice without suspension, continuing in effect until and including Sept. 30, 1933, the present surcharges as such, except that there shall be no surcharge on non-ferrous ores and concentrates and only one surcharge of 6 c. per ton in connection with the transportation of lake-cargo coal from the originating mine to the ultimate destination.

In the original report only Commissioner Tate dissented. In this report there were four dissenting opinions and one commissioner concurred only in the result. Just what will be done with the surcharges by the state commissions is not known at this time. The Ohio commission, for example, has denied the carrier petition asking for permission to publish tariffs continuing the emergency charges, on short notice. This means that such emergency charges will not be effective in Ohio after March 31, until 30 days after the new tariffs have been filed or until some time after April 20. Then the new tariffs are subject to suspension proceedings. Inasmuch as the federal commission has fixed Sept. 30 as the final date on which these charges can be levied, there is some question as to whether they will be as active in prescribing these charges for intrastate application under the authority granted in Sec. 13. The pooling plan originally adopted for distribution of the surcharge revenues has not been satisfactory and the railroads have decided to drop it.—I. C. C. Docket Ex Parte 103.

Examiners' Reports

Cement.—Examiner A. S. Worthington recommends that the commission find the rates on cement from Chattanooga, Tenn., to destinations in the Carolinas, not unreasonable or otherwise unlawful and dismiss the complaint.—I. C. C. Docket No. 25,429, Signal Mountain Portland Cement Co. *v.* Alcolu *et al.*

Examiner Leland F. James proposes that the commission find the rate on interstate shipments of cement from Alsen, N. Y., to Harlem River Transfer, N. Y., unreasonable but not otherwise unlawful to the extent it exceeded or may exceed 12½c., and proposes the new rate and reparation.—I. C. C. Docket No. 25,557, North American Cement Corp. *v.* N. Y. C. *et al.*

New Complaints Filed

Sand.—A new rate and reparation are sought on the shipment of glass sand from Mapleton, Pa., to Corning, N. Y., on an allegation of unreasonable rates and charges.—I. C. C. Docket No. 25,813, Corning Glass Works, Corning, N. Y. *v.* Pennsylvania *et al.*

Stone Dust.—Alleging unreasonable rates on stone dust from McVitty's, O., to Muncie, Ind., the complainants ask for a new rate and reparation.—I. C. C. Docket No. 25,788, Herzog Lime & Stone Co. *et al* Forest, O. *v.* C. C. C. & St. L.

Talc.—Alleging violation of Sec. 1, the complainants ask for new rates and reparation in connection with shipments of talc from Emeryville, Hailesboro, New York Harbor lighterage, N. Y., Weehawken and Hoboken, N. J., to Brooklyn and other New York points.—I. C. C. Docket No. 25,805, Wittaker, Clarke & Daniels, Inc. *et al,* New York, N. Y. *v.* N. Y. C. *et al.*

Terrazzo Material.—The complainants seek a new rate and reparation on an allegation of unreasonable rates and charges on terrazzo material (crushed stone) between Tulsa, Okla., and Springfield, O.—I. C. C. Docket No. 25,787, Tulsa Terrazzo & Mosaic Co., Tulsa, Okla., *v.* C. R. I. & P. *et al.*

Rate-Committee Dockets

New England Freight Assn.

Agricultural Limestone.—It is proposed to establish rates on agricultural limestone, car-load minimum weight 50,000 lb., from Canan, Conn., to destinations named in New Haven I. C. C. F-3, 135, (Item Nos. 1,160 and 1,165) and I. C. C. F-3,159, the same as are currently effective from West Stockbridge, Mass.—Docket No. 25,082.

Feldspar.—To equalize competing routes the carriers propose to cancel the commodity rate of 25 c. on crude or ground feldspar applying from Burleyville, Cardigan, Cold River, Grafton, Keene, Matthews, Ossipee, Rumney, South Lyndeboro and Swainboro, N. H., to New Castle Jct., Pa., via various routes allowing the rate of 25½ c. published in N. E. F. A. I. C. C. No. 200 to apply.—Docket No. 28,377.

Gypsum Filler.—Shippers request the amendment of the various eastbound billing guides to provide for a commodity arbitrary on gypsum filler, from Brownville Jct., and Northern Maine Jct., Me., to Millinocket and East Millinocket, Me., of 7 c. per 100 lb., and to Madawaska, Me., of 21 c. per 100 lb., car-load minimum weight 40,000 lb., to provide the same carload arbitraries as on clay.—Docket No. 28,635.

Trunk Line Assn.

Amiesite.—To eliminate fourth-section departures the carriers propose to increase the rate on coated crushed stone, car-load minimum weight 40,000 lb., from Fort Norfolk, Va., to Eastville, Va., from 45 c. to 60 c. per net ton.—Docket No. 30,547.

Shippers propose rates based on a mileage scale to apply on coated crushed stone from Roanoke and Marion, Va., and Hagerstown (Security), Md., to points in Official Classification territory ranging from 15 mi. and under, single-line 70 c., joint hauls 90 c. per ton to $2.60 for a single-line haul and $3 for a joint haul in the block between 530 and 560 mi.—Docket No. M-3,200.

Cement.—Shippers propose the establishment of rates per 100 lb. on cement, car-load minimum weight 50,000 lb., from York, Pa., to destinations on the Rutland, representative of which are: To Ogdensburg and North Lawrence, N. Y., 21 c.; Moira and Chrubusco, N. Y., 21½ c.; to Clinton Mills and Champlain, N. Y., 22 c.; and to Rouses Point, N. Y., 21 c.—Docket No. 30,574.

Dolomite.—Rates on roasted dolomite, car-load minimum weight 60,000 lb., from Blue Bell and Williams, Pa., to Ansonia, Conn., of 17 c., and to Pittsfield, Mass., of 19 c. per 100 lb., are proposed by shippers.—Docket No. 30,514.

Shippers propose a rate on roasted dolomite, car-load minimum weight 60,000 lb., from Natural Bridge, N. Y., to South Duquesne and Clairton, Pa., of $2.54 per net ton.—Docket No. 30,591.

Ground Limestone.—Carriers propose the publication of the following rates per 100 lb. on ground limestone, car-load minimum weight 50,000 lb., from York, Exton, Swatara, Swedeland, Williams and Plymouth Meeting, Pa., to Bowmansville, Guelph, Galt, Kitchener, Peterboro and Toronto, Ont., 25 c.; to Ottawa, Ont., 22 c.; to Pembroke, Ont., 27 c.; and to Bertheirville, Que., 23½ c.—Docket No. 30,502, Sup. 1.

Lime.—An increase in the rates on lime to correct tariff error and the establishment of the same rates as are in effect from other points in the Chester Valley Group is proposed by shippers, the following rates to apply on (A) building lime, car-load minimum weight 30,000 lb., (B) agricultural and land lime, car-load minimum weight 30,000 lb., (C) chemical, gas and glass lime, car-load minimum weight 30,000 lb., (D) ground limestone, car-load minimum weight 50,000 lb., from Devault and Swedesford Road, Pa., to King's Creek and Kingston, Md., (A) 14 c.; Exmore, Va., to Cheirton, Va., (B), (C) and (D) 13 c.—Docket No. 30,551.

Plaster and Related Articles.—To eliminate fourth-section departures carriers propose increases in the rates on (A) plaster and related articles and (B) plaster-board, from Garbutt and Wheatland, N. Y., to C. V. Ry. stations, Essex Jct., Cambridge, St. Albans, Enosburgh Falls, Swanton, Highgate Springs, Vt., and various: (A) Rates ranging from 20½ c. to 25 c. and (B) rates ranging from 22½ c. to 27 c. per 100 lb.—Docket No. 30,522.

Sand.—Shippers propose a reduction in the rate on building sand loaded in open-top cars without tarpaulin or

other protective covering [1], from Berkeley Springs, Great Capacon and Hancock, W. Va., to Curtis Bay (Baltimore), Md., and Locust Point (Baltimore), Md., for B. & O. delivery only, from $1.30 to $1 per net ton, to apply as a proportional rate on traffic destined to points on the Pacific Coast of the U. S., Alaska and British Columbia and moving via the Panama Canal. —Docket No. 30,512.

Sand and Gravel.—Rates of $1.60 per ton for box-car shipment and $1.40 for open-top-car movement are proposed by shippers to apply on sand and gravel,[1] from Flanders, N. J., to Florence and Burlington, N. J.—Docket No. 30,565.

An increase in the rates on sand and gravel,[1] from Machias, N. Y., to Bradford, Pa., from 80 c. to $1 per ton is proposed by the carriers.—Docket No. 30,578.

Sulphur.—Shippers propose a rate on ground sulphur, car-load minimum weight 60,000 lb., from Baltimore, Md., to Cumberland, Md., of 17½ c. per 100 lb.—Docket No. 30,518.

Terrazzo Aggregate.—A rating of 20 per cent. of first-class rates on crushed stone or crushed marble (terrazzo aggregate), in bulk or in bags in box-cars, car-load minimum weight 60,000 lb., from Springwood, Va., to destinations in Trunk Line, C. F. A. and New England Territories, is proposed by shippers.—Docket No. M-3,187.

Central Freight Assn.

Agricultural Limestone.—A reduction in the rate on agricultural limestone, car-load minimum weight 50,000 lb., from Woodville and Gibsonburg, O., to Lafayette, Ind., from $2.60 to $2.30 per net ton is sought by shippers.—Docket No. 34,773.

Shippers at Chicago, Ill., are asking for the establishment of rates on agricultural, ground or pulverized limestone, in bulk or in bags in box-cars, car-load minimum weight 60,000 lb., to points on the N. Y. C. Representative proposed rates are: To South Bend, Ind., $1.50; to White Pigeon, Mich., $1.55; to Sturgis, Mich., $1.60; to Quincy, Mich., $1.65; to Jonesville, Mich., $1.70; to Detroit, Mich., $1.95. —Docket No. 34,968.

Cement.—Carriers propose to establish commodity rates on cement from Bay City, Mich., to destinations in the upper peninsula of Michigan in lieu of the Class C rates now applying. Representative proposed rates are: To St. Ignace, 13½ c.; to Kenneth, 14 c.; to Eckerman, 14½ c.; to Sault St. Marie, 15½ c.; to Houghton, 18½ c.; to North Bessemer, 19 c.; to Wells, 16 c.; to Escanaba, 16 c.; to Channing, 17½ c.; to Manistique, 15½ c.—Docket No. 35,032.

Crushed Stone.—Shippers propose a reduction in the rate on crushed stone from Kenneth, Ind., to South Bend, Ind., from 84 c. to 65 c. per net ton.—Docket No. 34,934.

Carriers propose to increase the rate on crushed stone and related articles from Marblehead, O., to Maximo, O., from 90 c. to $1.40 per net ton.—Docket No. 35,007.

Firestone.—A rate on firestone, car-load minimum weight 60,000 lb., from New Castle, Pa., to Ft. Wayne, Ind., of $2.60 per ton is proposed by shippers.—Docket No. 35,049.

Fluorspar.—The following reduced rates are proposed by carriers to apply on fluorspar, in packages or in bulk, car-load minimum weight 40,000 lb., from Freedom, Pa.: To Monaca, Pa., $1.40; to Bridgeville, Pittsburgh, Pa., Toronto, O., $1.60; to Fallansbee, W. Va., $1.80; to Washington, Pa.; $2.00; to Mansfield, O., $2.80; to Verona, McKeesport, Pa., $1.60; to Breaburn, Brackenridge, Pa., $1.80; to Glassport, Pa., $1.60; to Latrobe, Pa., $2.00; to Johnstown, Pa., $2.40 per net ton.—Docket No. 34,761.

Slag.—A reduction in the rate on slag from Mingo Jct., O., to Navarre, O., from 60 c. to 50 c. per ton is proposed by shippers.—Docket No. 34,-998.

Illinois Freight Assn.

Ground Limestone.—Adjustments in the rates on ground limestone,[1] from La Salle, Ill., are proposed. Representative proposed rates are: To Chicago for local delivery 75 c., for switch movement delivery, 95 c.; to East Moline, Ill., 88 c.; to Joliet, Ill., 75 c.; to Rock Island, Ill., 88 c.; to Davenport, Ia., $1.01 per net ton.—Docket No. 7,149.

Western Trunk Lines Committee

Lime.—It is proposed to increase the rate on lime, car-load minimum weight 30,000 lb., from Menominee, Mich., to Madison, Wis., from 11 c. to 12½ c. per 100 lb. Docket No. 2,689-I.

Sand.—Establishment of the following rates on silica sand,[1] from Ottawa, Utica and Wedron, Ill., is proposed: To Detroit, Mich., Toledo and Cleveland, O., $2.40 per ton; to Buffalo, N. Y., and points grouped therewith, $3.01 per ton.—Docket No. 7,012-2.

Southern Freight Assn.

Cement.—It is proposed to increase the rate on cement from Kosmosdale, Ky., to Louisville, Ky., to 6½ c. per 100 lb.—Docket No. 525.

Ground Limestone.—Shippers at Krause, Ill., propose the establishment of rates on ground limestone [1] to points in the Mississippi Valley in Kentucky, Tennessee and Mississippi, based on the mileage scale shown on p. 13 of S. F. A. Tariff 227-B.—Docket No. 574.

Texas-Louisiana Tariff Bureau

Cement.—To meet motor-truck competition shippers propose the establishment of rates on cement between points in Texas based on the mileage scale shown below.—Docket No. 8,850-TX.

Miles	Rate
25	3 c.
30	4 c.
35	5 c.
40	6 c.
45	7 c.
50	8 c.
60	9 c.
75	10 c.

Transcontinental Freight Bureau

Cement.—Shippers request the establishment of a rate on cement from Birmingham, Ala., district (Group M) of 68½ c. in Tariffs 1-M and 4-J.—Docket No. 14,793.

Sulphur.—Shippers request that Barba, La., be included in Items 8,728 and 8,730 of Tariff 1-M at the same rates as apply from Texas.—Docket No. 14,778.

[1] The car-load minimum weight will be 90 per cent. of the marked capacity of the car, except that when the car is loaded to its full cubical or visible capacity, the actual weight will apply.

Tennessee Sand-Washing Plant Nears Completion

The sand-washing plant upon which construction was begun last December by T. L. Herbert & Sons, Nashville, Tennessee, is nearing completion and is expected to be in operation in March. All equipment is set with the exception of the conveyor head assembly and the steel receiving hopper at the incline track. Two Deister-Overstrom diagonal-deck concentrating tables have been installed. The separation made by these tables will give two well-defined products, a masonry and a concrete sand. The tables are specially designed to meet their particular use.

Other improvements being made will modernize the incline track for the electric hoist, which handles material from the loading station to the concrete storage bin. This incline was formerly of wooden construction, but the wood is replaced with concrete, and provision has been made for discharging sand on one side of the track and gravel on the other by the use of a movable steel door between two steel bulkheads, the door being central and horizontal with the track, is pivoted on the top of the concrete wall in order to make divisions of the two types of material when unloading. Material from this point can be handled by locomotive cranes to the storage piles.

A steel hopper will receive dewatered and washed sand from the washing plant and this sand will be handled by incline car to yard storage, railroad cars, storage bins for truck loading or for continuous mix concrete. The same hopper will be used to reclaim and handle material from yard storage to any of the four delivery points mentioned above.

Lamb and Kahrl Head Mt. Vernon Sand Firm

The directors of the Mt. Vernon Sand & Gravel Co., Mt. Vernon, O., recently held a meeting at which R. M. Lamb was elected president and Fred W. Kahrl, secretary, treasurer and manager. This meeting was preceded by a meeting of stockholders at which, in addition to these above named, the following were elected directors: W. J. Sperry, Milton S. Lewis and Ralph Walker.

Foreign Developments

Small Lime Plants in French Wine District

A considerable part of the lime produced in France still comes from crude intermittent kilns, often serving for the burning of bricks and tiles as well as lime. This is the case particularly in the center and south of France, in the vineyard districts, and a large part of the lime so produced is used by the growers for the preparation of Bordeaux mixture for spraying their vines. Such kilns are usually of brick, with an interior capacity of 2,100 to 2,500 cu. ft. (60 to 70 cu.m.); they are of square or rectangular section, usually open, and are often built against hillocks. The usual fuel is wood.

Alix Cornille describes in *Revue des Materiaux de Construction* for December, 1932 (No. 279:500-4), and January, 1933 (No. 280:17-9) a number of practical measures for the chemical control of the product in these small operations.

Investigates Activity of Rumanian Trasses

An investigation reported by Dr. A. Steopoe of Bucharest in *Revue des Materiaux de Construction* (No. 279: 493-6, Dec., 1932) studies the effect of various physical and chemical agencies on the reactivity of two Rumanian trasses in lime or cement mortars. He finds that the reactivity of the trass depends not alone on the alkalinity in calcium hydroxide. Activity and strengths are higher with increasing moisture and temperature at which the mortar specimens are stored. Weathering the trass before increases the strength of mortars made with it. Introducing magnesium or sodium sulphates or magnesium chloride in small amounts in the mixing water increases the reactivity and mortar strength. In all the cases studied increases in reactivity of the trass were accompanied by increases in the strength of the mortars made with it.

Propose Heat Test for Determination of Set

In a study of the relation between the time of setting and the heat evolved by a cement during setting, published in *Zement* for Jan. 5, 1933 (22:2-7), Prof. A. Kleinligel and Dr. K. Hajnai-Konyi recommend the replacement of needle tests for setting time by a method dependent on the evolution of heat.

The uncertainties of the needle method have been recognized for a long time, and were demonstrated vividly in a report by Dr. Haegermann to the International Congress for Testing Materials at Amsterdam in 1927. An identical cement tested at various laboratories showed initial sets ranging from 1½ to 4 hr. and a final set of 9¾ to 20 hr.

Important data on the heat evolved during the setting—developed by Prof. Joyce in Switzerland (1926), French studies at the Plougastel bridge (1927), N. Nacken (1929), Oscar Faber (1930), the Rittergut Iüdersdorf G.m.b.H. (1930) and Davey in *Concrete and Constructional Engineering* (1931)—are analyzed. From the curves of temperatures developed during the setting the authors devise curves which represent the rate at which heat is liberated and which they take as the most convenient characteristic of the setting. They believe that "there should be no special difficulty in standardizing uniformly the apparatus to be used for the measurements of heat, for the investigation both of neat cement and of concrete specimens of various mixes."

A New Service for PIT AND QUARRY Readers

In response to numerous requests for English versions of technical papers published in foreign languages PIT AND QUARRY *has decided to undertake to supply translations of such articles to those who desire them. In the expectation that the demand for this type of service will grow as readers become increasingly familiar with its advantages, a very moderate scale of service charges, based on the actual cost of the labor and materials involved, has been devised. These charges are, on the average, only about one-third of current professional translating prices.*

An English translation of any foreign-language article abstracted in these columns will be furnished promptly on order and will be accompanied, if the article is illustrated, by whatever photostatic reproductions may be necessary. Naturally, prices will vary in general according to the length of the articles and the number of photostatic reproductions accompanying them. They have been made lower than the actual cost warrants in the belief that this will encourage enough orders for any given paper to cover the production costs involved. In view of the unavoidably great variation in these production costs, prices will be quoted only on request.

Those who ask for them will receive regularly lists of articles and the costs at which translations can be furnished. Such a list, including all the articles abstracted in the January, February and March issues of PIT AND QUARRY, *the two articles mentioned in footnotes 18 and 19 on page 39 of the March issue, and giving prices, is available and will be sent to anyone requesting it.*

Fix Silica Admixture By Using Dilute NaOH

In the quantitative determination of siliceous admixtures to cement, such as trass, quartz sand or diatomaceous earth, an essential problem is the removal of colloidal silica resulting from the decomposition of cement in the analysis. Dilute acid does not completely dissolve it, and concentrated acid, while it dissolves the gel, also reacts with the admixture.

P. N. Grigorieff and S. E. Chaikina of Moscow advance these objections to acid tests in *Tonindustrie-Zeitung* (57:38 and 62, Jan. 12 and 19, 1933), and report that in their own investigations good results were obtained from the use of dilute alkali solutions, particularly n/10 sodium hydroxide. This solution dissolves the silica cold better than the 5-per cent. boiling soda solution recommended by Lunge. In the method developed, the sample is boiled with NaCl and hydrochloric acid to decompose the cement, leaving the admixture unaltered. The specimen is filtered and the washed filtrate treated with the NaOH solution to remove the colloidal silica. The residue is then ignited (or dried, if the admixture is a hydrous silica material) and the content computed in percentage of the specimen employed.

In a series of check analyses, compared with quantities of admixture known to be present, this method showed a variation of not over 1 per cent.

The authors also found that there is comparatively little error if the admixture is computed on the basis of the CaO-content of the mixture, assuming the CaO-content of pure cement to be 65 per cent. Thus, if a mixture shows an average content of 58.5 per cent. CaO, the cement content is

$$\frac{x}{58.5} = \frac{100}{65} = 90 \text{ per cent.},$$

and the content of the admixture, 10 per cent. Errors of −1.76 to +1.28 per cent. were found in analyses of cements containing 10 to 30 per cent. of admixture.

In a later issue (*Tonindustrie-Zeitung* 57:185, Feb. 23), Dr. W. Wittekind reports a series of check analyses, in which he found the soda method applicable to trass only when the trass is very high in silica. The ordinary German trasses, however, gave results varying widely from reality. Wittekind considers the best method for determining the trass in trass cement to be the method of computation from the lime content, assuming an average lime content of 3 per cent. for the trass itself.

Silos Built in Winter at Dutch Cement Plant

A group of five cement-storage silos, each 76 ft. high and 26½ ft. in inside diameter, was built last year in the dead of winter for the Dutch cement plant "Cemij" Cementfabriek-Ijmuiden N. V., using the Macdonald sliding-form construction procedure. The Macdonald method was used especially because of its feasibility even at very low temperatures, as the contract was let in late autumn and called for completion of the silos within five months.

As described by E. A. F. Huber, engineer of the N. V. Nederlandsche Betonmaatschappij, builders of the silos, in *Beton und Eisen* (Berlin, 1932, No. 23), the silos are built in two units, one of three and one of two cells. The temperature averaged about —5 deg. C. during the week while the first unit was being poured to a height of 72 ft., yet concreting was successfully carried out. Aggregates and mixing water were preheated before mixing, and the exterior walls were protected by canvas. The silo walls, uniformly 8 in. thick, were completed without either inner or outer surfacing of any kind and are guaranteed to remain watertight for 10 yr., even though the sea is only about a mile (1½ km.) away.

The silos were built of concrete prepared from iron-Portland cement, fine dune sand, Rhine sand and gravel in volume proportions of 1:½: 2:2½.

Conversion of Gypsum in Grinding of Cement

Basing his opinions partly on his own investigations and partly on recent research by other investigators, Dr. Paul Schachtschabel discusses in *Zement* for Jan. 26 (22:45-49) the dehydration of gypsum at various temperatures and partial vapor pressures, particularly in the grinding of cement clinker. Schachtschabel reduced the water content of gypsum over P_2O_5 to 0.84 per cent. at 45 deg. C., and at 80 deg. to 0.76 per cent. At 165 deg. the water was reduced after 2 mo. to 0.3 per cent. In all cases, X-ray examination still showed the structure of the hemihydrate and no trace of anhydrite.

Schachtschabel proposes to unify the designations for the $CoSO_4$ compounds according to their water content thus:

Gypsum (dihydrate), 20.93 per cent.

Hemihydrate (half-hydrate), 6.61 per cent.

Soluble anhydrite (dehydrated hemihydrate), 6.60 to 0 per cent.

Anhydrite (natural anhydrite, dead-burned gypsum van't Hoff's soluble anhydrite), 0 per cent.

All $CaSO_4$ compounds have the same solubility, but in connection with the retarding of the setting of cement it is the rapidity of solution that matters. Soluble anhydrite converts in about 2 min. in water to hemihydrate. Hemihydrate is stable in damp air, but in water forms supersaturated solutions. Schachtschabel concludes that the absorption of moisture by clinker during grinding leads to the formation of hemihydrate and soluble anhydrite even at moderate temperatures. The short setting time of finely-ground cements is attributed in part to the formation of considerable amounts of hemihydrate and soluble anhydrite.

Mortar and Concrete Waterproofing Methods

In *Zement* for Dec. 29, 1932, and Jan. 12, 1933 (21:737-43 and 22:23-5), Dr. C. R. Platzmann summarizes and discusses briefly a great many processes employed for making mortar and concrete impermeable to water, with references to the European and American patent and periodical literature. Sixty-four methods aim at increasing the density of the entire mass, as by depositing colloidal compounds in the pores. Twenty-one provide merely a waterproofing coating, either a colorless coating of paraffin or wax base, a black cold application of bituminous base, or a dense surface achieved by impregnating the cement surface with fluoride compounds.

Practical Evaluation of the Alite Controversy

Dr. Vieri Sevieri (Florence, Italy) reviews in the December, 1932, *Revue des Materiaux de Construction* (No. 279:485-8) the long and sometimes bitter dispute over tricalcium silicate and the constitution of alite. He lays particular stress on recent investigations of the strength properties of the calcium silicates and ferrites individually, and considers it most important to determine the constitution of a cement that will yield the optimum relation between the tricalcium and the dicalcium silicate and a strength that none of the components possess alone.

Recommends "Standard" Stone Test for Uses

Adoption of one or more "standard" stones for evaluating test results seems obviously desirable. Dr. Otto Burre, writing in *Steinindustrie* (28: 19-22, Feb. 2, 1933), discusses the various possibilities for Germany. Should one stone be standard in all tests, or should there be different standards in the case of different classes of stone, or for testing different uses? A study of typical German stones makes him believe that a standard stone for all classes of rock and for all properties is not practical; a specific stone should be adopted for evaluating suitability for a specific use.

Action of Lime in Set of Aluminous Cements

In a note to the French Academy of Sciences printed in the January issue of *Le Ciment* (38:9-10), M. Seailles confirms the conclusion of Travers and Sehnoutka and Lansing Wells (Bureau of Standards *Jnl. of Research*, Dec., 1928) that the crystallization of the calcium aluminates is a function of the pH index of the solution. However, he finds that it is a function of the pH not merely as determined by lime but in any medium whatever of alkaline reaction. That is, alumnia and lime in solution will form the aluminates $3CaO.Al_2O_3.nH_2O$ or $4CaO.Al_2O_3.12H_2O$, according as the pH is below or above 12, whether the pH be determined by CaO or any other base. This Seailles considers a much more satisfactory explanation of the deleterious action of Portland cement or free lime on the setting and hardening of aluminous cements than the explanation of Lafuma (thesis, 1925) that the formation of the tetracalcium aluminate is occasioned by the simple presence of the additional lime.

The substitution of a solution of soda or of potash for the solution of lime gives an identical result and an immediate precipitation. The low strength of alumina cements with which free lime is present at the setting is explained not by supposing with Lafuma a hydration without preliminary solution, but by the fact that the solution does not have time to become supersaturated and to recrystallize in developed crystals. The aluminate passes into solution easily, but precipitates at once, as in Le Chatelier's experiments.

Standardization for Heat Freed During Set

Increase in the temperature of concrete because of the heat liberated during the setting of the cement is an advantage in the case of cold-weather construction but a disadvantage in dams and other massive concrete works where the heat sets up internal stresses. There is therefore much interest in recent studies of setting heat, such as Professor Probst's observations on the Schluchsee and Bleilochtal dams in Germany, and recent American laboratory investigations, the findings from the latter being applied in the construction of the Pine Canyon Dam.

Dipl.-Ing. S. Herz, reviewing these investigations in *Tonindustrie-Zeitung* (56:1204, Dec. 5, 1932), suggests the application of the information thus gained to the formulation of standard specifications for the heat liberation of a cement. The conclusions, in general, show a close connection between the heat liberation and the chemical composition of the cement, particularly its content in tricalcium aluminate, indicating the possibility of control in the manufacture of the cement.

Recent Patents

American

Blasting

Blasting-cartridge charged with a compressed gas. Frank H. Armstrong, Chicago, Ill., assignor to Safety Mining Co., same place. No. 1,895,563.

Blasting-cap. John A. Hammond, Albany, Cal., assignor to California Cap Co., Oakland, Cal. No. 1,898,011.

Burning

Method and apparatus for burning cement. Robert W. P. Horn, Allentown, and Jacob H. Nissley, Manheim, Pa. No. 1,898,776.

Calcining

Apparatus for calcining gypsum. Lewis C. Karrick and William L. Ellerbeck, Salt Lake City, Utah. No. 1,897,259.

Gypsum-calciner. William M. McNeil, Chicago, Ill., assignor to United States Gypsum Co. No. 1,897,394.

Crushing

Eccentric or draw-rod for stone-crushers. Friedrich Helmrich, Magdeburg, Germany. No. 1,895,390.

Means for breaking rock and other hard materials. Edward Lafayette, Pittsburg, Kan. No. 1,896,960.

Crusher. Johan R. Bakstad, Chicago, Ill., assignor to Jeffrey Mfg. Co. No. 1,899,930.

Shear-pin for crushing-machines. William W. Guest, Los Angeles, Cal. No. 1,901,159.

Drilling

Valve for rock-drills. Albert Feucht, Cleveland, O., assignor to Cleveland Rock Drill Co., same place. No. 1,895,153.

Rotation-control mechanism for drills. Gustave M. Nell, Detroit, Mich., assignor to Chicago Pneumatic Tool Co. No. 1,895,860.

Rock-drill. Harvey Mecom, Liberty, Tex. No. 1,897,267.

Mining-machine bit and bit-holder. Benjamin F. Rassieur, Webster Groves, and Calvin P. Bascom, Clayton, Mo., assignors to Central Mine Equipment Co., St. Louis, Mo. No. 1,897,331.

Valve for rock-drills. Edward F. Terry, Easton, Pa., assignor to Ingersoll-Rand Co. No. 1,897,595.

Drill for mining purposes. Erle Ormsby and Calvin P. Bascom, St. Louis, Mo., assignors to Central Mine Equipment Co. No. 1,897,733.

Drill for mining purposes. Calvin P. Bascom, St. Louis, Mo., and Harry A. Kluge, Collinsville, Ill., assignors to Central Mine Equipment Co. No. 1,897,785.

Rock-drill. William H. Mosher, Easton, Pa., assignor to Ingersoll-Rand Co. No. 1,898,639.

Air-feed mounting for rock-drills. Fred M. Slater, Easton, Pa., assignor to Ingersoll-Rand Co. No. 1,898,645.

Valve for rock-drills. George W. Hulshizer, Stewartsville, N. J., assignor to Ingersoll-Rand Co. No. 1,898,665.

Rock-drill. Louis W. Greve, Cleveland, O., assignor to Cleveland Rock Drill Co. No. 1,898,772.

Feeding device for rock-drills. George W. Hulshizer, Stewartsville, N. J., assignor to Ingersoll-Rand Co. No. 1,898,999.

Excavating

Excavating-machine. Robert R. Downie, Beaver Falls, Pa. No. 1,896,293.

Power-actuated dipper. Joseph P. Murtaugh, Chicago Heights, Ill., assignor to American Manganese Steel Co., same place. No. 1,896,414.

Rubber-jointed chain for trench-excavating device. Erich H. Lichtenberg, Milwaukee, Wis., assignor to Koehring Co. No. 1,896,711.

Excavating-bucket shackle. John L. Tunison, Chicago, Ill., assignor to Bucyrus-Monighan Co., same place. No. 1,897,346.

Crowding and racking-in mechanism for excavator-cranes. Stephen N. Nickless, Laureldale, Pa. No. 1,899,901.

Excavator. Kirwan Messick, Clarendon, Va. No. 1,899,345.

Excavator mechanism. George T. Ronk, Cedar Rapids, Ia. No. 1,898,395.

Boom-feet for excavators. Werner Lehman and Mitchell L. Fyske, South Milwaukee, Wis., assignor to Bucyrus-Erie Co. No. 1,898,453.

Excavator. Reinhard Bergmann, West Allis, Wis., assignor to Harnischfeger Corp. No. 1,898,810.

Mechanically-operated bucket. Vance S. Firestone, Freeport, Ill., assignor to Arcade Mfg. Co., same place. No. 1,901,555.

Feeding

Feeding apparatus for mill rolls. William Stein, Evansville, Ind. No. 1,896,724.

Loading

Automatically loading machine for distributing sand, gravel, and the like. Eugene J. N. Millet, Paris, France. No. 1,901,523.

PIT AND QUARRY *will furnish, at its actual cost, a copy of any patent cited here. A charge of ten cents per copy is made by the U. S. Patent Office, Washington, D. C., and readers may procure a copy directly by addressing the Commissioner of Patents, with payment for copies requested. Postage stamps are not accepted by the Patent Office. We will endeavor to obtain copies of foreign patents for our readers but we cannot give assurance in every case for the reason that copies of such patents are not printed for distribution as liberally as are the American copies, nor is there a fixed charge per copy.*

Lime

Process of making lime from oyster shells. Cecil R. Haden, Houston, Tex., assignor to Haden Lime Co., same place. No. 1,896,403.

Mining

Mining apparatus. Louis A. Maxson, Claremont, N. H., assignor to Sullivan Machinery Co. No. 1,896,184.

Mining-machine. Frank A. Mindgren, Western Springs, Ill., assignor to Goodman Mfg. Co. No. 1,897,984.

Mining-machine. Frederick W. Vodoz, Wilmette, Ill., assignor to Goodman Mfg. Co. No. 1,900,780.

Mining-machine. Leon E. Simmons, Claremont, N. H., assignor to Sullivan Machinery Co. No. 1,901,127.

Mixing

Automatic concrete-aggregate-proportioning apparatus. Bert and Robert J. Noble, Los Angeles, Cal., assignors to Roads Construction Co., same place. No. 1,897,490.

Foreign

Crushing

Tube mill with air-current removal of material. Humboldt-Deutzmotoren Akt.-Ges., Köln-Kalk. German 563,437.

Grinding mills. W. G. Hamblin. British 382,705.

Stone-breaking machines and granulators. W. Baillie. British 382,928.

Method of and plant for wet grinding of raw cement material. M. Vogel-Jörgensen. British 384,736.

Grinding or crushing apparatus. R. A. Lister & Co., Ltd., and W. G. Maw. British 385,100.

Crusher. Dominion Engineering Works, Ltd., Lachine, assignee of Hubert G. Welsford and Andrew N. Russell, Montreal, Que. Canadian 327,355.

Drilling

Fluid-pressure-operated rock-drilling and like tools. Sir W. G. Armstrong, Whitworth & Co. (Engineers), Ltd., and E. H. Sweetser. British 382,399.

Rotary drills for drilling rock, coal and the like. British Jeffrey-Diamond, Ltd. British 382,678.

Four-jaw chucks for drills or other tools. K. Hassner. British 382,798.

Chucks or sockets for holding rotary drills or other tools. British Jeffrey-Diamond, Ltd. British 382,887.

Percussive tools. Svenska Hammaraktiebolaget. British 382,888.

Lamp-attachment fitting for rock drills and the like. J. Gray (General Electric Co.). British 383,988.

Distributing valves and valve gear for fluid-pressure percussive tools. Chicago Pneumatic Tool Co. British 384,840.

Rock drill. Ingersoll-Rand Co. British 384,869.

Oiling devices for fluid-actuated rock drills. Ingersoll-Rand Co. British 384,918.

Mounting for rock drills. W. W. Triggs (Ingersoll-Rand Co.). British 385,209.

Earth and rock drilling apparatus. William R. MacDonald, Southampton, England. Canadian 327,988.

Drying

Rotary drying apparatus. J. S. Withers (Naamlooze Vennootschap Maschinefabriek Geb. Stork & Co.). British 382,056.

Drying apparatus for sand. Rudolf Schneider, Düsseldorf. German 513,-264.

Rotary drier, especially for cement raw materials. Harry Stehmann, Berlin-Südende, Germany. German 554,-775.

Rotary drier with counter and parallel-current gas movement. Büttner-Werke Akt.-Ges., Urdingen a. Rh., Germany. German 563,366.

Rotary drier. Demag Akt.-Ges., Duisburg, Germany. German 562,707.

Device for removing deposits from inner walls of rotary driers or calciners. Büttner-Werke Akt.-Ges., Urdingen a. Rh. German 562,973.

Drying chamber with endless conveyor. Nicola P. Pantzireff, Moscow, U. S. S. R. German 564,106.

Rotary drier. Büttner-Werke Akt.-Ges., Urdingen a. Rh. German 563,-751.

Cooler following rotary drier. Büttner-Werke Akt.-Ges., Urdingen a. Rh. German 563,944.

Apparatus for drying or mixing stone or the like. B. G. W. Bartlett. British 383,657.

Excavating

Excavating machine. L. Hammer. British 379,297.

Bucket dredges. F. W. Payne & Son. British 383,687.

Power shovels. A. Faure and A. Faure. British 383,881.

Dredges and cranes. Orenstein & Koppel Akt.-Ges. British 385,228.

Gypsum

Process for producing gypsum and the like tiles with fibre filler. Carl Backmeier, Stuttgart. German 557,-223.

Process for treating burned gypsum with water in vapor or finely divided state. Societe Lambert Freres & Cie., Paris, France. German 553,519.

Improvements in plaster mixtures. Imperial Chemical Industries, Ltd. French 730,357.

Gypsum bandage production. Karl Mienes, Charlottenburg, Germany. Canadian 327,391.

Kilns

Electrically heated shaft or chamber kiln for burning natural carbonates, recovering practically pure carbon dioxide. Dr. Gustav Blume, Munich. German 554,292.

Drawing device for shaft kilns handling principally lump material. Albert Eberhard, Wolfenbüttel. German 553,485.

Feeding device for rotary tubes, particularly cement kilns. Bessemer Cement Corp., Youngstown, Ohio. German 556,655.

Apparatus for burning wet material, especially cement slurry. Dr. Nikolaus Polgar, Vienna, Austria. German 557,225.

Process and apparatus for manufacture of cement and other products in rotary kilns. C. Pontoppidan. French 731,269.

Process and apparatus for drying, calcining, or sintering lime, alumina, gypsum, cement, ore, etc. "Miag" Mühlenbau und Industrie Akt.-Ges. French 731,331.

Shaft kiln for burning cement, fed with mixed fuel and charge. Dipl.-Ing. Hans Engel, Stettin. German 553,616, addition to 548,663.

Processes of and plants for burning cement, lime and like materials. H. A. Gill (F. L. Smidth & Co. Aktieselskab). British 384,060.

Lime and Magnesia

Process for production of sintered magnesia. Kali-Chemie Akt.-Ges., Berlin. German 553,138.

Oxychloride cement compositions. M. Cervello. British 384,043.

Material-Handling

Pump for transporting concrete or other stiff fluid materials. Jacobus Dijkman, Voorschoten, Holland. German 548,561.

Conveying apparatus for bulk materials. "Miag" Mühlenbau und Industrie Akt.-Ges., Brunswick. German 553,486.

Bin. J. Pohlig Akt.-Ges., Köln-Zollstock. German 551,579.

Tipping containers for stone or the like. B. G. W. Bartlett. British 382,-624.

Apparatus for discharging materials, such as dust, from hoppers and the like. F. B. Allen. British 383,-683.

Method and means for delivering proportionate quantities of powdered, granular and like materials. J. Vögele Akt.-Ges. British 383,805.

Belt conveyors. G. Clephan and F. Turnbull. British 384,368.

Conveyors of the belt type. Mavor & Coulson, Ltd., and J. Thomson. British 385,053.

Process and apparatus for conveying muddy substances, for example, thick cement slurry. F. Krupp Grusonwerk Akt.-Ges. British 385,137.

Conveying system. George H. Stanley, Ardith, and George W. Parker, Harris, Sask. Canadian 327,542.

Mixing

Automatic continuous hydrators and mixers for hydraulic and other products. A. Sorcel. French 728,959.

Machines for mixing concrete and the like. H. Langford and Winget, Ltd. British 383,745 and 383,749.

Concrete-mixing machine. G. Jaeger. British 384,566.

Screening and Separating

Screening device. Ton und Steinwerkzeuge W. Richter & Cie. Akt.-Ges., Bitterfeld. German 560,773.

Apparatus for separation of granular materials. M. Bouquet. British 382,875.

Machines for screening or grading stones, sand, gravel, grain, potatoes, and such like. G. Henderson. British 383,665.

Apparatus for sifting or grading discrete materials. F. Krupp Grusonwerk Akt.-Ges. British 383,903.

Shaker sieves made of wire gauze and used for vibrators. R. Herrmann. British 384,170.

Mechanically oscillating sifting or screening devices. G. H. Schieferstein. British 385,010.

Pneumatic separators. Allgemeine Elektricitäts Ges. British 385,014.

Silica

Production of silica bricks. Herm. Salmang and B. Wentz, Aachen. German 557,286, addition to 555,767, and 556,861, addition to 555,767.

Process for production of silica bricks by forming and burning mixes of lime-bearing silica masses and mineralizers such as alkali compounds, magnesium oxide, iron oxide or the like. Dr.-Ing. Hermann Salmang and Dipl.-Ing. Benno Wentz, Aachen. German 555,767.

Unclassified

Process for production of refractory silica mortar by mixing materials consisting essentially of silica and lime. Heinrich Koppers Akt.-Ges., Essen. German 553,484.

Process for producing a silica-bearing basic material for silica mortar. Dr. C. Otto & Co. G. m. b. H., Bochum. German 554,205, addition to 549,262.

Process for utilizing low-grade or waste industrial dusts (e.g. from electrical precipitators). Metallgesellschaft Akt.-Ges., Frankfurt a. M. German 560,925.

Process for producing refractory material from slag. Arthur Sprenger, Berlin-Karlshorst. German 557,153.

Roll press, particularly for briquetting cement mix and the like. Westfalia-Dinnendahl-Gröppel Akt.-Ges., Bochum. German 557,221.

Manufacture and application of artificial marble. J. M. Capdaze. French 728,202.

Silicious refractory mortar with lime admixture. Dr. C. Otto & Co. G.m.b.H., Bochum. German 561,793.

Process for preparatory treatment of silicious minerals for aggregates to hydraulic and bituminous mortar and concrete. Georg Wieland, Berlin-Zehlendorf. German 556,256.

Heat-insulating material. E. L. Francis (Gypsum, Lime & Alabastine, Canada, Ltd.). British 383,248.

Nozzles for spraying cement and like calcareous materials in plastic or liquid form. A. A. A. Byrd. British 384,049.

Methods of and apparatus for producing soluble phosphate from phosphate rock. A. H. Stevens (Phosphate Acidulating Corp.). British 385,071.

Plastic material constituted by a mixture of a filling with calcium sulphate and zinc and calcium hydroxychloride. Soc. des Brevets Etrangers La Neoxyle, assignee of Jean de Granville, Paris, France. Canadian 328,889.

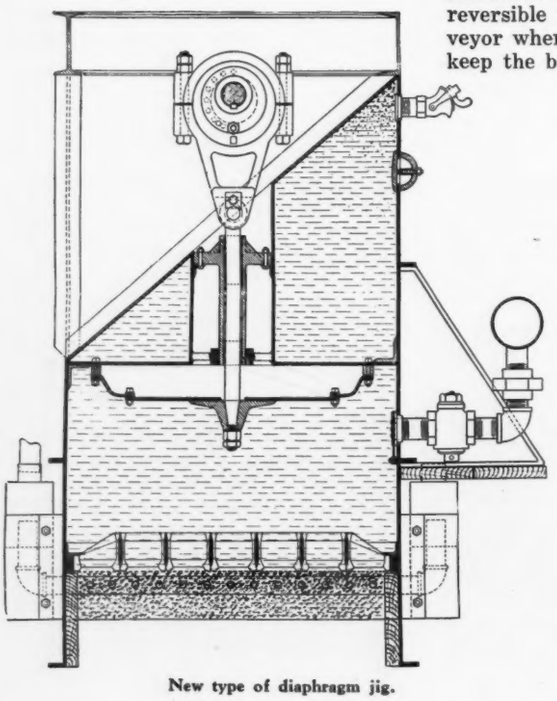
New Machinery and Supplies

Diaphragm Jig Removes Shales, Dirt from Gravel

F. N. Bendelari, president of the Consolidated Lead & Zinc Co., Joplin, Mo., has developed a diaphragm jig which, it is said, successfully removes shale, lignite, coal, soft stone, etc., from gravel. The advantages claimed for this jig are: high efficiency because of the even action over the whole bed, compactness, and rapid stratification.

These jigs are made in two sizes, one to handle gravel from 1 in. down to ⅜ in. in size, and the other to handle minus ⅜-in. material. They are constructed of ⅜-in. plate and structural steel electrically welded. In this jig diaphragms instead of plungers are used to cause the pulsations. The lineshaft and eccentrics are below the hutches and a tube, extending through each hutch to the plate which carries the diaphragm, makes it possible to connect the eccentric by means of a wrist pin and crosshead without using a stuffing box. Due to this construction the movement of the diaphragm is vertical and the weight of the diaphragm head is carried on the crosshead instead of on the rubber diaphragm, which acts only as a seal.

The control valves are interesting. Water from a manifold is admitted below the sieves through check valves on the downstroke of each diaphragm and the amount of water can be regulated while running by means of the control valves. The sieve frames also are unusual in that the webs are stream-lined and touch the sieve cloths only at the intersections of the webs, where the cloths are supported and fastened. This renders practically the whole sieve area effective. Provision is made for lifting the sieve frames without injuring the cloths.



New type of diaphragm jig.

Special Idlers Keep Conveyor Belt in Line

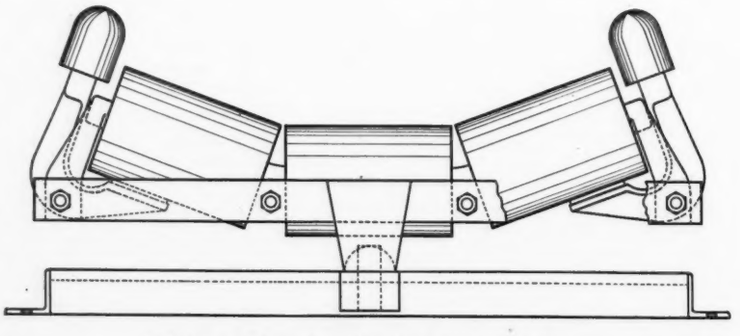
The Robins Conveying Belt Co., New York, N. Y., has developed a training trougher idler which automatically trains the upper or loaded strand of a belt conveyor. A belt training return idler has also been developed to make the return belt run straight even if caked with sticky material.

The training trougher is automatic and instantaneous in its action. If the belt starts to run off to one side, its edge touches one of the two side rollers, instantly applying a brake to the idler end pulley. This causes a slight drag on that side which swings the whole idler about its central vertical pivot, thus steering the belt back to its normal central position. The light contact of the belt with the vertical roller is only momentary.

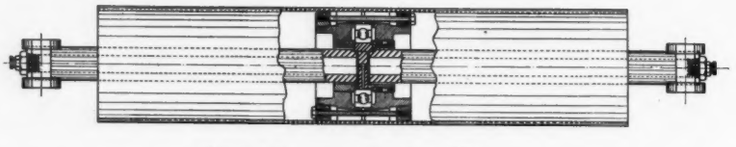
The idler is of standard roller-bearing construction, with labyrinth and cork washer grease seals, simple and effective, high-pressure lubrication, narrow gaps between pulleys, and a base of substantial design. The end rollers are mounted on anti-friction bearings and special pivoted brackets, the lower ends of which carry the asbestos brake blocks. It is said that these idlers, substituted for every fourth or fifth troughing idler on a reversible conveyor, or on any conveyor where a belt runs crooked, will keep the belt centered and free from edge wear. The training trougher is made with backing interchangeable with Robins standard troughing idlers, and can easily be adapted to replace idlers of other makes. It is offered in sizes for all standard belt widths.

The return belt-training idler consists of a tubular roller centrally-mounted on a single anti-friction bearing internally-pivoted on a fixed swivel pin located on the center line of the conveyor and inclined forward about 30 deg. The roller is free, not only to rotate on the bearing, but also to rock about this pivot.

When the weight of the belt falls more on one side of the pivot than on the other the roller rocks downward on the heavy side. At the same time, due to the inclination of the swivel pin, the roller moves forward on the down side and backward on the up side, thus becoming skewed with relation to the belt and causing the belt to move back to the conveyor center line. It is made for all standard belt widths up to 60-in. It is interchangeable with Robins standard return idlers and may be easily modified to replace return idlers of other makes. Under normal conditions best results are obtained by substituting one belt-training idler for every eighth return idler, or about every 80 ft. Under the most adverse conditions it may be necessary to replace every fifth idler or about every 50 ft.



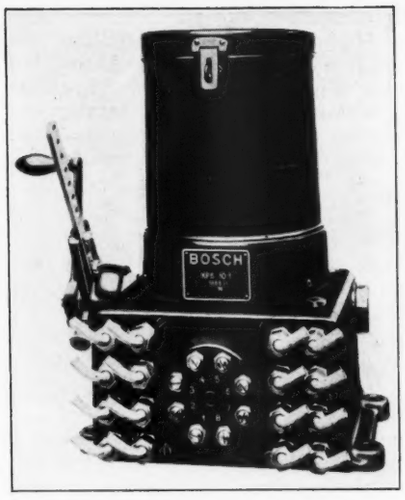
Training trougher idler with side rollers and brakes.



Belt-training return conveyor idler.

Forced—Feed Lubricator for Cement Machinery

The United American Bosch Corp., Springfield, Mass., manufactures a complete line of automatic positive forced-feed grease lubricators



Automatic forced-feed grease lubricator.

for all types of machinery. The "k" types are specially designed for machinery in cement mills, mines and other nonmetallic-mineral operations.

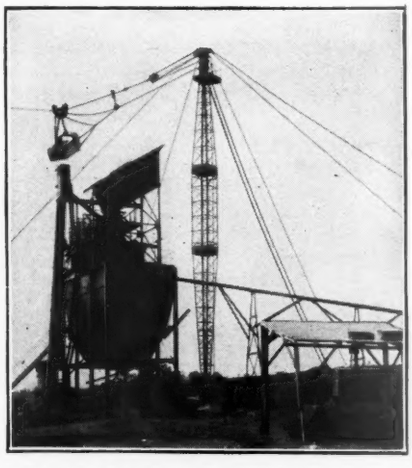
These lubricators are of simple and rugged construction, consisting of two main parts—a cylindrical tank, which serves as a container for the grease, the scoop and the helical disk feeder, and the box-shaped cast-iron base which houses the entire pump system with its drive mechanism. The pumping mechanism is identical with that of the Bosch forced-feed oil lubricator, consisting of concentrically-arranged pump units and the pump shaft with its two disk cams which actuate the pump plungers and the grease-guide plungers.

The lubricator drive-shaft is driven from any suitable moving part of the machine to which it is applied. The slowly-rotating feeding mechanism pushes the grease contained in the tank through the strainer and presses the lubricant into the inlet opening of the pump unit, which forces it against high-resistance pressures by means of feed tubing leading to the points to be lubricated. The grease-guide plunger acts as the distributor for the grease, allowing it to pass to one and then to the other of the two outlets of the pump unit. These lubricators are built with various ratios between the drive-shaft and the pump-shaft to meet different operating conditions. All the working parts are completely inclosed, are easily accessible, self-lubricating, and require very little power.

The rate of feed is controlled, first, by the drive end, the ratio between the drive-shaft and the pump-shaft, and, second, by the adjustment of the individual pump unit. Where it is required that a varying quantity of grease be delivered to the different lubricating points, each pump unit can be adjusted independently. By turning the adjusting screws the effective stroke of the plunger can be altered, increasing or decreasing the quantity of grease delivered as desired. Each pump unit, therefore, can be adjusted independently, so that varying quantities of grease can be supplied to different bearings to suit their individual needs. A hand crank on the lubricator can be used for priming or, in case of necessity, for supplying an increased quantity of lubricant without affecting the normal adjustment.

Slack-Line Cableway for Small-Size Sand Plants

Sauerman Bros., Inc., Chicago, has introduced a series of slack-line excavators that are particularly adaptable for operation with portable or semi-portable crushing-and-screening plants. These new machines belong to the Sauerman "Utility" line of low-priced, long-range excavators. While these machines are lighter than



Slack-line excavator and "semi-portable" crushing-and-screening plant.

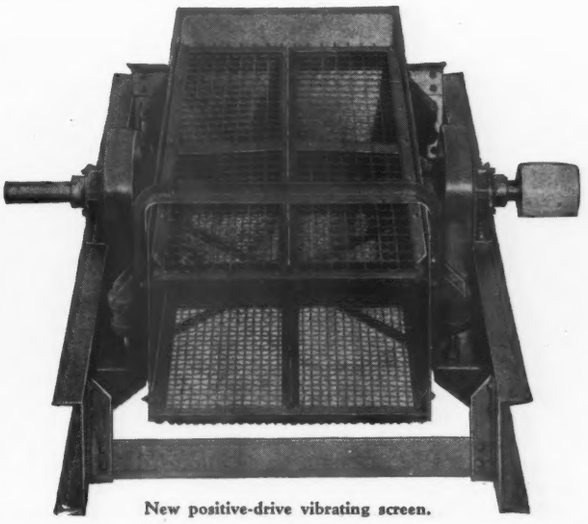
the heavy-duty Sauerman machines that have been used for all classes of excavating, they lack none of the sturdiness of the older, heavier machines. Most of the saving in weight has been achieved without sacrificing strength.

The smallest size of Sauerman "Utility" slack-line cableway excavator, equipped with a ¼-cu. yd. bucket is a suitable excavating and conveying unit for a small plant. Operating on a span of 500 ft., it will handle about 10 cu. yd. per hr. On a 200-ft. span it will dig and convey an average of 18 cu. yd. per hr. The other sizes, equipped respectively with buckets of ½-, ¾- and 1-cu. yd. capacity, have proportionately larger handling capacities up to 60 cu. yd. per hr.

Among the improved details of the "Utility" slack-line excavators are (1) The design of the excavator bucket is such as to insure great penetrating power whether working in dry, wet or sticky earth. The bucket is of welded-steel construction and has a structural-steel bail and a renewable reinforced bottom. (2) The hoists for these machines are equipped with more powerful engines or motors than were specified formerly for machines of similar rated capacity. (3) "Durolite" steel guide blocks are furnished for the mast-top assembly. (4) The carrier of the bucket is equipped with alloy-steel track sheaves.

Antifriction Bearings in New Vibrating Screens

A new line of positive-drive, antifriction-bearing, vibrating screens with perfect balance built in is now offered by the Pioneer Gravel Equipment Mfg. Co. of Minneapolis, Minn. For ten years this company has built vibrating screens for sand rejection in its portable plants, and since 1927 has used positive-drive vibrators for pit-run screening of materials of No. 3 mesh size to dust. Perfect balance built in means that the screen pen is balanced in itself, and that the eccentric shaft (with heavy steel flywheels machined all over) and the screen pan on the shaft are also balanced after assembly. Dirt-proof steel housings of labyrinth style are used for mounting the heavy eccentric shaft running in heavy-duty self-aligning SKF bearings. The eccentric shaft has these bearings and closures both on the screen pan and the main frame, so that the vibration of the screen pan is created by means of the positive action of the eccentric shaft's ¼-in. stroke. The wire-screen frame embodies a simple and positive means of keeping the cloth in proper tension, and may be quickly removed by loosening the two clamping side bars. The screen pan is adjustable from 22 to 27 deg. as to slope by means of four corner rubber cushions. The screens are run at 1,200 r.p.m. against the flow of material when the slope of the pan is over 22 deg. Pioneer vibrator screens are offered in four sizes ranging from 24-in. by 48-in. to 48-in. by 96-in., and in single- and double-deck forms, except in the larger size, which is also offered with triple decks.



New positive-drive vibrating screen.

Manufacturers' Publications

Copies of any of these publications may be had by writing the manufacturers who publish them. Please mention PIT & QUARRY *when writing.*

Concrete Machinery

Concrete Pump. 6 p. folder. (Chain Belt Co., Milwaukee, Wis.) Describes methods of using equipment and is profusely illustrated with operation photographs.

Conveyor Belting

Maxecon Conveyor Belting. (B. F. Goodrich Rubber Co., Akron, O.) A 4-p. insert for the Goodrich mechanical-rubber-goods catalog describes the Maxecon general-service conveyor belt. A number of illustrations show typical installations. The Goodrich hot-material belt is also described.

Crushers and Pulverizers

Swing-Hammer Pulverizers and Crushers. 48 p. (Cat. No. 550. Jeffrey Mfg. Co., Columbus, O.) Describes and illustrates the various sizes and types of swing-hammer crushers and pulverizers made by this company, giving specifications and capacities for various materials and for various sizes of these materials. It also describes washers and feeders and gives suggestions for installing and operating this equipment.

Drill Bits

Timken Rock Bit. 20 p. (Timken Roller Bearing Service & Sales Co., Canton, O.) Describes and illustrates the various sizes of rock bits made by this company.

Mixing Plants

Cedar Rapids Bituminous Mixing Plants. (Iowa Mfg. Co., Cedar Rapids, Ia.) Folder describes and illustrates the Cedar Rapids plant-mix and road-mix types of bituminous mixing plants.

Motor Reducer

Motor Reduction Units. 4 p. (Bull. 1164. Allis-Chalmers Mfg. Co., Milwaukee, Wis.) Describes and illustrates flexible and integral types of motor reduction units of from 1 to 50 hp., giving ratings, speeds, etc.

Motors

Self-Syn Electric Motors. 24 p. (Bull. No. 540. Ideal Electric & Mfg. Co., Mansfield, O.) Describes and illustrates the Self-Syn self-excited, self-synchronizing, self-contained general-purpose synchronous motors and gives many facts regarding their operation and upkeep. It also gives sizes, dimensions, characteristics, applications, data for power-factor correction, etc.

Portable-Plant Equipment

Crushers and Portable Plants. 24 p. (Cat. No. 113. Universal Crusher Co., Cedar Rapids, Ia.) Describes and illustrates the various types of stationary and portable jaw crushers, crushing rolls, portable crushing and screening plants, semi-portable bins, conveyors, feeders, and parts for the above equipment. Also includes tables of sizes and specifications.

Safety Equipment

Respirators. 4 p. (Chicago Eyeshield Co., Chicago, Ill.) Pamphlet describes the Cesco Style No. 76 and 77 industrial-safety respirators.

Tractors

Cletrac 80 Tractor. (Cleveland Tractor Co., Cleveland, O.) Two folders describe the Cletrac 80 tractor and are illustrated with installation photographs showing these units in use in various fields.

Transmission Belting

Highflex Transmission Belting. (B. F. Goodrich Rubber Co., Akron, O.) An 8-p. insert for the Goodrich mechanical-rubber-goods catalog describes the Highflex transmission belt and illustrates its many features.

Welded-Plate Construction

Hoover Dam. 16 p. (Babcock & Wilcox Co., New York, N. Y.) Bulletin briefly describes the Hoover Dam project as a whole and in greater detail the gigantic welded plate-steel pipes being fabricated and installed in the hydraulic power and normal-flow control tunnels.

Pumpings from the Old Pit

Fifteen Years Ago

AN editorial published in PIT AND QUARRY pointed out that the motor truck as a means of hauling sand, gravel, stone and kindred materials was no longer an experiment and that its efficiency and economy had been conclusively demonstrated by users in these industries.

* * *

In Columbus, O., representatives of slag companies, comprising about 90 per cent. of the capacity of the industry, met to form the National Slag Assn. Leading slag producers had been intending to organize for several years but their action was hastened by their desire to be represented on the board of directors of the Highway Industries Assn.

Ten Years Ago

THE Columbia Quarry Co., St. Louis, Mo., opened a new crushed-stone plant at Chester, Ill., making the seventh quarry operated by this company.

* * *

The Turner Gravel Co., San Antonio, Tex., was incorporated with a capital stock of $50,000. Shortly afterward the capital stock was increased to $150,000. The incorporators were A. P. Turner, L. Hetlage and James Aiken.

* * *

The International Portland Cement Corp., New York, N. Y., purchased the plant of the Bonner Portland Cement Co., Bonner Springs, Kan., for $600,000. This plant was built in 1908 and at the time of the sale had a capacity of 1,500 bbl. daily.

* * *

Five Years Ago

THE new plant of the Alabama Lime & Stone Co., Calera, Ala., was put in operation. This plant has two lime kilns and a capacity of 4,000 tons per day of crushed stone.

* * *

A combination of the Peerless Cement Co. and the New Egyptian Cement Co. was effected. The new company was known as the Peerless Eyptian Cement Co. with offices at Detroit, Mich.

* * *

The American Silica Co. was formed to take over crude-sand properties near Ottawa, Ill., valued at more than $1,500,000. Among the more important companies taken over were the Ottawa Molding Sand Co., the Buffalo Rock Silica Co., and the Higby Reynolds Sand Co.

*Effects of Inhaling the Dusts of Minerals**

By DR. LEROY U. GARDNER
Director,
Saranac Laboratory for the
Study of Tuberculosis

AS long as men have worked in stone it has been appreciated that an unusually large proportion of them suffer from disease of the lungs. It was natural to assume that such disease would be caused by the dust generated, and this belief was strengthened by the discovery of black, grey or red pigments in the lungs, sometimes accompanied by the formation of scar tissue.

The term, pneumoconiosis was introduced to describe the lung pigmented in this manner. With further observation pathologists attempted to classify various forms of pneumoconiosis on a basis of the type of dust inhaled and such names as anthracosis, siderosis, chacicosis and even byssinosis and tobaccosis made their appearance. It was recognized that some forms of the disease were attended by severe symptoms and result in death but there was no correlation between the clinical and pathological pictures and the causative dust. Finally statistical study demonstrated that, of all kinds of industrial dusts, silica generally produced a definite type of disease with a characteristic pathological lesion and complex of symptoms. Today the clinical entity known as silicosis is one form of pneumoconiosis which is quite clearly defined. Moreover, within the last three or four years asbestos dust has also been shown to produce another specific type of reaction attended by symptoms differing in some respects from those of silicosis.

The other forms of pneumoconiosis still lack complete definition. The widespread use of radiography has brought together a mass of descriptive data from individuals exposed to many kinds of occupational dusts, but these findings have not yet been correlated with pathological anatomy, chemical studies of the tissues, and detailed analyses of industrial atmospheres. There is a tendency to assume that many of these pulmonary changes are due to the action of silica perhaps modified by the chemical components of the dust. We shall only be in a position to speak with assurance about them when the pure types of dust and their various combinations have been studied in human beings or in experimental animals.

For the sake of clarity no mention has been made of the infections which so frequently complicate some forms of pneumoconiosis. In the prebacteriological era of medicine the use of such terms as "grinders' consumption" and "miners' phthisis" reflects the popular association of pneumoconiosis with tubercolosis. The names were justified both by clinical and pathological observation for it has been subsequently shown that, in silicosis at least, a superimposed tuberculosis may cause death in perhaps 75 per cent. of the cases. Some observers even go so far as to state that silicosis itself does not develop unless the lungs are previously damaged by a latent tuberculosis infection. This is probably an exaggeration, for typical silicosis can be produced in the experimental animal by the inhalation of silica without infection.

The *rôle* of asbestos dust as an excitant of tuberculous infection is not as clear-cut as that of pure silica. While there are numerous reports of death in asbestosis due to a terminal tuberculosis, nevertheless surveys of living workers have failed to demonstrate any excess of such infection. Simple anthracosis is said to prevent the progression of a tuberculous infection. Statistics from coal-mining districts do show a tuberculosis rate much lower than that "normal" for the age group. As yet corroborated experimental proof of protective action of coal against tuberculous infection is lacking.

Not only the tubercle bacillus but other bacteria seem to develop with special facility in the tissues previously damaged by silica. For example, the pneumonia rate among silicotic native laborers of South Africa is many times that in nonsilicotic natives living under similar conditions. In coal miners, likewise, pneumonia is a common and often fatal complication. Case reports of fatal pneumonia in asbestosis are frequent, but morbidity statistics from large groups of asbestos workers are lacking. For most other dusts the data are even more fragmentary.

What has been said of the effects of inhaled inorganic dusts would indicate that the reaction of the tissues is not merely a response to mechanical irritation by particulate matter. Today it is generally accepted that the injury is chemical in nature and that only certain of the common types of industrial dusts possess properties capable of exciting reaction. In the cases of silica and the silicate of magnesium or asbestos the slightly alkaline body fluids probably affect a slow solution of the dust particles, liberating silica in colloidal form. This substance irritates the connective tissue cells which respond by multiplying. The result is an overgrowth of the supporting framework elements at the expense of the more delicate cells specialized for specific functions.

For these two types of dust the character and form of the pathological changes has been carefully worked out. In silicosis the essential tissue change consists of nodules of connective tissue which develop first in the lymphoid tissues situated in the drainage apparatus of the lungs. These nodules interfere with the physiological removal of foreign bodies and subsequently inhaled particles accumulate in the framework of the lung itself. Such reaction gradually decreases the normal elasticity of the organ and encroaches upon its functional elements. As a result the cardinal symptom of the disease, dyspnœa or shortness of breath develops. Because of the excessive amounts of scar tissue formed in the lungs the right side of the heart encounters increasing difficulty in forcing blood into the organs. In an attempt to compensate the overworked heart muscle becomes thicker and heavier but, unless infection intervenes, the time eventually arrives when the heart fails and death occurs from this cause.

The reasons for the prevalence of infection in the silicotic lung are not altogether clear. It is obvious that when the drainage system is so obstructed by nodules of scar tissue that more dust particles can only be removed with difficulty, the same must be true of bacteria which may be inhaled. As a consequence they remain in the lung and set up progressive infections. But this is not the whole story. The silicotic tissue apparently offers a peculiarly favorable soil for the continued multiplication of tubercle bacilli and perhaps other bacteria. Experiment has shown that even attenuated organisms of this type will produce rapidly fatal tuberculosis in a silicotic guinea pig. Furthermore, inhaled silica dust will cause a preëxisting latent tuberculous infection, harboring a few attenuated bacilli, to become progressive and spread. The cause of this effect upon tuberculous infection has not yet been ascertained, but the writer believes that it is in some way associated with the death of tissue caused by the toxic silica. Associated with this factor is

* Abstracted from an address before the Industrial Health and the Metal Sections' Joint Session, 21st Annual Congress, National Safety Council.

an increased activity of the phagocytes which are stimulated by the irritating silica, so that these cells tend to migrate rapidly and carry tubercle bacilli into previously uninvolved portions of the lung. The case of other infections has not yet received intensive study but similar mechanisms may be involved.

Asbestos dust, perhaps because of its fibrous structure, is not transported very far within the lung. It tends to lodge along the walls of the finer tubes and little of it is removed by the lymphatic drainage system. Tissue reaction, probably initiated by the solution of the fibers, occurs in their immediate vicinity. As in the case of silica this reaction consists of an overgrowth of the connective tissues which is later transformed into leather-like scars. The arrangement of the scar tissue in asbestosis is quite different from the nodular collections in silicosis because of the difference in localization of the foreign particles. In asbestosis the deposition along the walls of fine tubes radiating from larger bronchi in all planes throughout the lung gives rise to a fine linear fibrosis with little or no nodule formation.

Aluminum oxide will serve admirably as an example of a nonsiliceous dust whose particles are as hard and sharp as those of crystalline silica. When a measured quantity of such particles, 1 to 3 micra in diameter, are injected into the ear vein of a rabbit, the majority of them come to rest in its liver and spleen. There they remain, apparently harmless, collected in large phagocytic cells and producing no reaction of the connective tissues for at least 2 yrs. Injection of the same quantity of the same sized quartz particles excites the formation of so much scar tissue that the functional elements are almost completely destroyed and the organs are reduced to nodular masses of leather-like consistence.

Carborundum, the carbide of silicon, when inhaled by guinea pigs for periods as long as 4 yr., likewise fails to excite significant overgrowth of the connective tissues. It produces only a low-grade inflammatory change with no nodules.

Instances such as those cited constitute the basis for believing that the cellular response to dust particles is not due to their hardness and sharpness but to chemical substances liberated by the action of the tissues upon them. The case for solubility has not been proved directly, for the detection of soluble silica in the tissues offers technical difficulties which to-day are unsurmountable. Nevertheless this substance is known to be a cell poison and in weak concentrations it will provoke an overgrowth of the connective tissues.

Finally, consider the silicosis of granite cutters. This develops somewhat more slowly than that of the pure quartz miner and it has been maintained that this is due to the relatively small amount of uncombined silica in granite (25 to 40 per cent.). But it is the writer's belief that other components of the glomerate granite may neutralize or at least inhibit the effects of the silica, so that only after prolonged exposures to high concentrations does significant reaction occur. While typical silicotic nodules develop in guinea pigs inhaling pure quartz for a year, not even the earliest suggestion of nodules have appeared in the lungs of animals inhaling comparable concentrations of granite (40 per cent. silica) for 4 yr.

This very brief discussion of some of the problems involved in pneumoconiosis draws attention to the limitations of our present knowledge. It indicates that the reaction to an inhaled dust is determined by the chemical and probably physical composition of that dust. It emphasizes the need of further study of different types of dust both in the pure state and in measured combinations. The ultimate aim of such a study should be the neutralization of the toxic action of such dangerous substances as silica.

New Trade-Marks

TRADE-MARKS recently passed for publication by the United States Patent Office and in line for registration unless opposition is filed are described briefly and illustrated below. This feature appears occasionally in PIT & QUARRY *through arrangements with the National Trade-Mark Co., Washington Loan & Trust Bldg., Washington, D. C. This concern will make an advance search free of charge on any trade-mark which producers may contemplate registering. Send inquiries direct to the company.*

No. 295,216—*Clap-Bricks*—For shingles, clapboards, and roofing materials of asbestos, felt, asphalt, slate or combinations thereof, and imitation-masonry building units for roofs, walls and siding. Frederick E. Horne, Malden, Mass. Claims use since Jan. 14, 1930. (The exclusive use of the word "Bricks" is disclaimed apart from the mark as shown.)

No. 314,043—*Duplex*—For brick molds. J. B. Crowell & Sons, Wallkill, N. Y. Claims use since Jan. 1, 1931.

No. 326,076—*Speed-wet*—For flexible abrasive paper and cloth. Behr-Manning Corp., Troy and Watervliet, N. Y. Claims use since Apr. 4, 1932. (Exclusive use of either of the words "Speed" or "Wet" is disclaimed apart from the mark as shown.)

No. 329,882—*Lubricite*—For raw and partly-prepared graphites. Annandale Graphite Corp., Annandale, N. J. Claims use since Oct. 1, 1928.

No. 331,797—*Koldlade*—For asphalt. Harry C. Neuberger, New York, N. Y. Claims use since Sept. 9, 1931. (Exclusive use of all wording appearing on the drawing is disclaimed.)

No. 332,160—*Chromix*—For plastic neutral base for monolithic construction composed of chrome ore and a suitable plasticising material. Quigley Co., Inc., New York, N. Y. Claims use since Sept. 19, 1931.

No. 332,961—*Priemsil*—For fullers' earth, bleaching earth, and activated clays. Wilhelm Priem & Co., G. m. b. H., Magdeburg, Germany. Claims use since 1929.

No. 333,217—*Aridclear*—For transparent damp-proofing liquid for masonry. Anti-Hydro Waterproofing Co., Newark, N. J. Claims use since Mar. 1, 1932.

No. 333,514 — *Plastacoustic* — For plaster. R. Guastavino Co., Boston, Mass. Claims use since Nov. 15, 1932.

New Incorporations

MEROM ILLINOIS CO., 1024 E. Moore St., Decatur, Ill. $5,000 common. E. B. Koehne, Ben Stone, Wm. H. Wyckoff, John E. Hollett, Indiana Trust Bldg., Indianapolis, Ind., correspondent.

CENTRAL AGGREGATES CO., Louisville, Ky. Incorporated about a year ago at Avoca, P. O. Anchorage, Ky., under name of Avoca Stone Co. Now changed its name to Central Aggregates Co., and its place of business to Louisville.

PORTAGE GRAVEL CO., Cleveland, O. 250 shares n.p.v. Henry Kutash, M. A. Friedman, F. C. Harris; Bernon, Mulligan, Keely & Lefever, Union Trust Bldg.

PITTS SLATE CORP., Arvonia, Va. Capital $25,000. R. W. Sepssard, Richmond, Va., and others.

PACIFIC GRAPHITE CORP., Everett, Wash. Capital $100,000. To mine and sell graphite, talc, gypsum, lime, silica, stone, manganese, etc. Arvid F. Hanson, Burlington, Wash.; Roy Pease and Elmer Bridges, Bow, Wash.; Manie Olson, Mt. Vernon, Wash.; J. E. Ryan, mining engineer.

OHIO & INDIANA STONE CORP. Reorganized. Capital stock, 1,000 shares Class A, $100 par value and 250 shares Class B n.p.v.

Eighteen tons per hour from a No. 19 Crusher—100% through three-eighth inch opening using less than fifteen horsepower

THE following is the result of a test on a No. 19 Kennedy Ball Bearing Gearless Crusher.

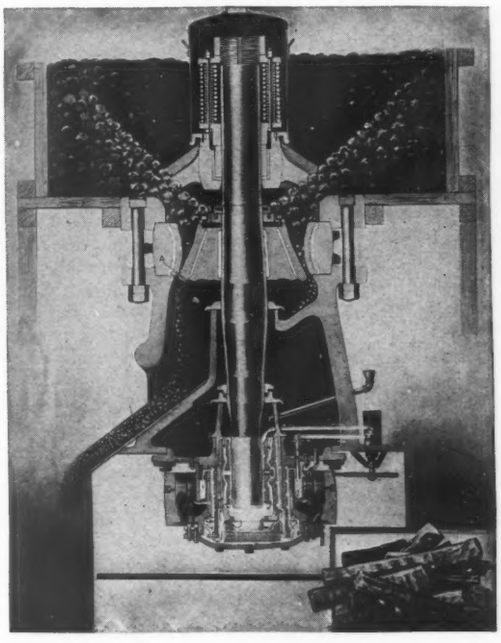
Exceedingly hard glacial gravel, 1½" and plus ⅜", was crushed for sand for concrete purposes, and less than fifteen horsepower was used.

The same crusher can be opened up and 1½" stone can be produced at a rate of from 30 to 50 tons per hour.

With the opening set to ⅛" on the closed side the following results were obtained:

Minus ⅜"	100 %
Plus 3 mesh	21½%
Minus 3—Plus 4	17 %
Minus 4—Plus 14	36½%
Minus 14—Plus 48	15 %
Minus 48—Plus 100	4 %
Minus 100	5½%

This was crushed at the rate of 18 tons per hour.



Built in various sizes with receiving openings from 1¾" to 14". Produces sizes from ⅛" to 3", with capacities up to 620 tons per hour on the larger sizes.

The Kennedy Ball Bearing Gearless Gyratory Crusher is guaranteed to do more crushing, size for size, of any given material, with less power consumption, than any crusher ever built. 90% Of the power input to motor is applied direct to breaking the rock between head and concaves. The head and shaft of the type "S" crusher is suspended on springs to permit tramp steel to pass through. The ball-and-socket eccentric is self-aligning. This crusher may be operated by a synchronous motor, built in the pulley of the crusher, or by belt from standard motor. This crusher takes one-half the power required for a geared crusher, and saves 80% in the cost of maintenance.

We manufacture a complete line of primary jaw and gyratory crushers, ball mills, rod mills, screening, elevating, and conveying equipment, etc. Complete information describing any or all of this machinery will be sent on request. *Send for latest information on our vibrating screen.*

KENNEDY-VAN SAUN MFG. and ENG. CORP.

Two Park Avenue **New York, N. Y.**

BRANCH OFFICES:—Chicago; 120 South La Salle St. Birmingham, Ala.; Comer Building. Los Angeles, Calif.; 416 South Spring St., London, England; Bush House, Paris, France; 40 Rue des Mathurins. Johannesburg, S. Africa; 73 Cullinan Bldg. Canadian Agents, Canadian Fairbanks-Morse Co., 980 St. Antoine St., Montreal, Que. Walkers Limited, Maryborough, Queensland, Australia. Cuban Agents, Gerard Jansen Y Cia, Compostela 43, Havana, Cuba.

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified, if brought to the attention of the Advertisers' Service Department.

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Agitating Ladders (Dredge)
Eagle Iron Works

Air-Filters
American Blower Corp.
Blaw-Knox Co.

Air Separators
Gay, Rubert M.
Universal Road Machinery Co.

Ash and Refuse-Handling Equipment
Haiss Mfg. Co., Geo.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Automatic Feeders
Jeffrey Mfg. Co.
Link-Belt Co.

Automatic Weighers
Blaw-Knox Co.

Backfillers
Austin-Western Road Mchy. Co.

Balls (Grinding)
Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.

Balls (Tube-Mill, etc.)
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Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.

Bearings (Anti-Friction)
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S K F Industries, Inc.

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S K F Industries, Inc.

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Sprout, Waldron & Co.

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Blasting Supplies
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Hercules Powder Co.

Blasting Machines
Hercules Powder Co.

Bodies (Motor Truck, Concrete Mixing)
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Jaeger Machine Co.

Blowers
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Blocks (Sheave)
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Borings, Core
Pennsylvania Drilling Co.
Sprague and Henwood Inc.

Bronze Work (Ornamental)
National Wire Cloth Co.

Bucket Elevators (See Conveyors and Elevators)

Buckets (Clamshell, Orange-Peel, Etc.)
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Haiss Mfg. Co., Geo.
Link-Belt Co.

Buckets (Dragline—Cableway)
Link-Belt Co.
Sauerman Bros., Inc.

Buckets (Elevator and Conveyor)
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Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan and Stone Corp.
Robins Conveying Belt Co.
Smith Engineering Works
Sprout, Waldron & Co.

Bulk-Cement Storage Plants
Sprout, Waldron & Co.

Cableways
American Steel & Wire Co.
Link-Belt Co.
Sauerman Bros., Inc.

Caps (Blasting)
Hercules Powder Co.

Capstans (See Winches and Capstans)

Car Dumpers
Link-Belt Co.

Car Pullers
Jeffrey Mfg. Co.
Link-Belt Co.

Carriers
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Smith Engineering Works
Sprout, Waldron & Co.

Cars (Quarry and Gravel Pit)
Austin-Western Road Mchy. Co.

Car Wheels—(See Wheels—Car)

Castings
Eagle Iron Works
Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Link-Belt Co.
McLanahan and Stone Corp.
Robins Conveying Belt Co.
Sprout, Waldron & Co.

Cement Pumps (See Pumps; Air Pumps; Pumps, Cement Slurry; Pumps, Bulk Cement)

Central Concrete-Mixing Plants (Complete)
Sprout, Waldron & Co.

Chain Drives
Link-Belt Co.

Chain (Elevating and Conveying)
Haiss Mfg. Co., Geo.
Jeffrey Mfg. Co.
Link-Belt Co.
Sprout, Waldron & Co.

Chutes and Chute Liners
Goodyear Tire & Rubber Co., Inc.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
Robins Conveying Belt Co.
Sprout, Waldron & Co.

Clamshell Buckets (See Buckets—Clamshell, Orange-peel, etc.)

Clamshell Gates (See Gates-Clamshell)

Classifiers
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
Link-Belt Co.

Clips (Wire Rope)
American Steel & Wire Co.

Clutches
Jeffrey Mfg. Co.
Link-Belt Co.
Sprout, Waldron & Co.

Coal-Pulverizing Equipment
Allis-Chalmers Mfg. Co.
Gay, Rubert M.
Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Universal Road Machinery Co.

Compressors (See Air Compressors)

Cones (Sand-Washing)
Link-Belt Co.
Smith Engineering Works

Conveyor Belting (See Belting)

Conveyor Idlers and Rolls
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Conveyors and Elevators
Allis-Chalmers Mfg. Co.
Barber-Greene Co.
Haiss Mfg. Co., Geo.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
Link-Belt Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
Robins Conveying Belt Co.
Smith Engineering Works
Sprout, Waldron & Co.
Universal Road Machinery Co.

Conveyors (Ready-Mixed Concrete)
Blaw-Knox Co.
Jaeger Machine Co.
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Robins Conveying Belt Co.

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Couplings (Flexible and Shaft)
Erie Pump and Engine Works
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Link-Belt Co.
Robins Conveying Belt Co.
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Cranes (Crawler and Locomotive)
Austin-Western Road Mchy. Co.
Bay City Shovels, Inc.
Link-Belt Co.

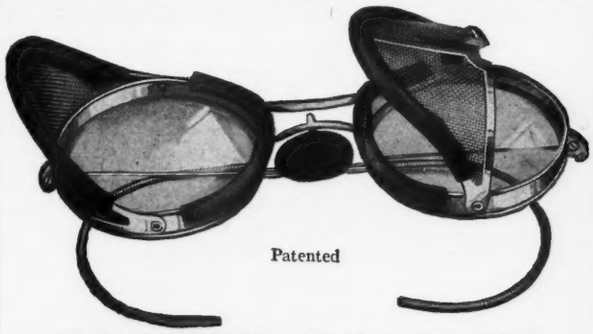
Crusher Parts
Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.

Crushers (Cone)
Nordberg Mfg. Co.

Crushers (Hammer)
Allis-Chalmers Mfg. Co.
Austin-Western Road Mchy. Co.
Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.

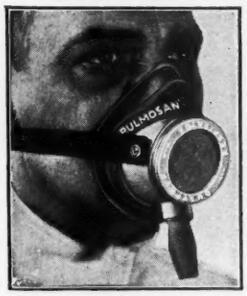
Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co.
Austin-Western Road Mchy. Co.
Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
Nordberg Mfg. Co.
Smith Engineering Works
Universal Road Machy. Co.

Crushers (Roll)
Allis-Chalmers Mfg. Co.
Austin-Western Road Mchy. Co.
Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Link-Belt Co.
McLanahan and Stone Corp.
Robins Conveying Belt Co.



Patented

SAFETY GOGGLES



R-110
Dustpruf Respirator

Most popular for protection against fine dusts. Weight, 2½ oz. Comfortable, adjustable, easy breathing.

Shatterproof — All Kinds
Now at
NEW LOW PRICES!

PULMOSAN RESPIRATORS

Protection Against
Dusts, Smoke or Fumes

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Also every device for Industrial Safety

•

Write for Safety literature and prices

Pulmosan Safety Equipment Corp.
176 Johnson St., Brooklyn, N. Y.

SIROCCO COLLECTOR
Getting 24 Tons of Material Per Day from One Kiln

"ONE SIROCCO COLLECTOR went into service at Howes Cave," writes a prominent engineer. "So far it is wonderfully successful, getting 24 tons of material per day from one kiln . . . The gases from the Collector appear to be practically pure fog and the snow adjacent to the plant is pure white, a condition which has not prevailed since the waste heat boilers were started."

An Invitation to Engineers

To describe to you the possibilities of the Sirocco Collector for each particular problem of material separation (the collection of material from air or gases) is impossible. We therefore urge engineers and executives interested in material separation to correspond with us regarding tests in our laboratory. Every problem of this type can be tested in a most thorough manner and reliable data can be compiled to show the results that can reasonably be expected of a Sirocco Collector installed in your plant. Write direct to the factory or call at any American Blower Branch Office. No obligation.

AMERICAN BLOWER CORPORATION, DETROIT, MICHIGAN
CANADIAN SIROCCO CO., LIMITED, WINDSOR, ONTARIO
BRANCH OFFICES IN ALL PRINCIPAL CITIES

American Blower
"Sirocco" VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT
MANUFACTURERS OF ALL TYPES OF AIR HANDLING EQUIPMENT SINCE 1881

COUPON

American Blower Corporation, 6000 Russell Street, Detroit, Mich.
Please send more data on the Sirocco Collector.

*Name*_____

*Firm Name*_____

*Address*_____ *City and State*_____ (1252)

The ROBT. E. LEE

HOTEL
250 modern rooms
each with private bath
WE QUOTE OUR TOP PRICE
$2.50 $2.00
A MATTER OF ECONOMY
GARAGE SERVICE
PERCY TYRRELL *Pres.*

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Same Ownership
ROBT. E. LEE
SAN ANTONIO, TEXAS

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18 TH AND PINE

ST. LOUIS

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

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Crushers (Rotary)
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Link-Belt Co.
McLanahan and Stone Corp.

Detonators
Hercules Powder Co.

Diesel Engines (See Engines—Diesel)

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Link-Belt Co.
Sauerman Bros., Inc.

Dragline Excavators
Austin-Western Road Mchy. Co.
Bay City Shovels, Inc.
Link-Belt Co.
Sauerman Bros., Inc.

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Drilling Contractors
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Sprague and Henwood Inc.

Drills (Blast-Hole)
Loomis Machine Co.

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Sprague and Henwood Inc.

Drills (Rock)
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Loomis Machine Co.

Drills (Well) (See Drills—Blast-Hole)

Drives (Multiple Belt, Chain, Rope)
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Dryers
Allis-Chalmers Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mach. Co.
McLanahan and Stone Corp.

Dust Arrestors
American Blower Corp.
Blaw-Knox Co.

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Allis-Chalmers Mfg. Co.
American Blower Corp.
Blaw-Knox Co.

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Pulmosan Safety Equipment Co.

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Elevators (See Conveyors and Elevators)

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McLanahan and Stone Corp.
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Sprout, Waldron & Co.

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Nordberg Mfg. Co.

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Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Link-Belt Co.
Morrow Mfg. Co.
Robins Conveying Belt Co.
Smith Engineering Works
Sprout, Waldron & Co.

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Hercules Powder Co.

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Goodyear Tire & Rubber Co., Inc.

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Gears and Pinions
Haiss Mfg. Co., Geo.
Jeffrey Mfg. Co.
Link-Belt Co.
Sprout, Waldron & Co.

Gears (Herringbone)
Jeffrey Mfg. Co.
Link-Belt Co.
Sprout, Waldron & Co.

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Grating (Steel)
Blaw-Knox Co.
Hendrick Mfg. Co.

Grinding Balls (See Balls, Grinding)

Grizzlies
Allis-Chalmers Mfg. Co.
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Hendrick Mfg. Co.
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Lewistown Fdy. & Mach. Co.
Robins Conveying Belt Co.
Smith Engineering Works
Universal Road Machy. Co.

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National Wire Cloth Co.

Guns (Hydraulic)
Georgia Iron Works

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Hoists
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan and Stone Corp.
Sauerman Bros., Inc.
Smith Engineering Works
Sprout, Waldron & Co.

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Goodyear Tire & Rubber Co., Inc.

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Hydraulic Guns (See Guns—Hydraulic)

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Allis-Chalmers Mfg. Co.
Barber-Greene Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Smith Engineering Works
Sprout, Waldron & Co.

Kilns and Coolers (Rotary)
Allis-Chalmers Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.

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Kennedy-Van Saun Mfg. and Eng. Corp.

Lime-Handling Equipment
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Linings (Ball- and Tube-Mill)
(See Mill Liners and Linings)

Loaders and Unloaders
Barber-Greene Co.
Haiss Mfg. Co., Geo.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Sprout, Waldron & Co.

Locomotives (Trolley-Battery)
Jeffrey Mfg. Co.

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United American Bosch Corp.

Lubricating Systems
United American Bosch Corp.

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Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.

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Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdy. & Mach. Co.
Sprout, Waldron & Co.

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Hendrick Mfg. Co.
Morrow Mfg. Co.
Sprout, Waldron & Co.

Pipe Flanges
Georgia Iron Works

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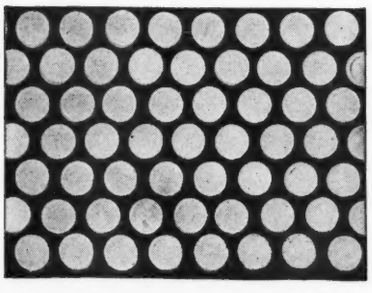
Portable Conveyors
Barber-Greene Co.
Haiss Mfg. Co., Geo.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Sprout, Waldron & Co.

SAVE

Here's how to save money in blasting: Investigate the complete Hercules line of explosives (designed to fit all blasting needs); then select and correctly use the best for each job. We'll help you.

MORROW SCREEN PLATES



MORROW PERFORATED METAL SCREEN PLATES for sizing and preparing coal, sand, gravel, stone and other bulk materials are made by a Company specializing in screening machinery.

A complete set of punches and dies covering a wide range of sizes, in round, square, oval and diagonal slots are ready for the press, insuring prompt delivery of orders.

Prices are right.
Send for Bulletin 57.

The Morrow Manufacturing Co.
Wellston, Ohio

WESTERN

Portable
Washing, Crushing, Screening
PLANTS

A small investment will enable you to produce high grade aggregate from roadside supplies.

Supplement your stationary plant with this economical equipment that leading producers have found to be a necessity in meeting present day competition.

Western Portable Crushing, Screening, and Washing Equipment embodies important improvements that have been developed through many years of experience in building mobile machinery.

The nation-wide service of the Austin-Western organization, always available on a few hours' notice, assures you of freedom from costly losses of working time.

Write today for complete specifications of Western Portable Plants. Learn how other producers are effectively overcoming the handicap of costly and difficult transportation.

Write for these interesting letters

The Austin-Western ROAD MACHINERY CO.

ROLLERS, CRUSHING & SCREENING PLANTS, SCARIFIERS, MOTOR GRADERS, PLOWS & SCRAPERS, BITUMINOUS PLANTS & SPRINKLERS, ROAD GRADERS, ELEVATING GRADERS, DRAGS, SHOVELS & CRANES, DUMP WAGONS

THE AUSTIN-WESTERN ROAD MACHINERY CO.
400 N. Michigan Ave., Chicago, Ill.

Please send me complete descriptions of the popular WESTERN Portable Washing, Crushing and Screening Equipment, and interesting testimonial letters from users of these machines.

Name .....
Address .....
City .....
State .....

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

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Jeffrey Mfg. Co.

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American Steel & Wire Co.

Power Shovels (See Shovels, Electric, Internal-Combustion and Steam)

Pulleys (Magnetic)
Sprout, Waldron & Co.

Pulleys (Wing)
Sprout, Waldron & Co.

Pulverized Fuel Systems
Gay, Rubert M.
Kennedy-Van Saun Mfg. and Eng. Corp.
Universal Road Machinery Co.

Pulverizers (See also Crushers; Mills; etc.)
Allis-Chalmers Mfg. Co.
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Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.

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Pumps (Cement Slurry)
Morris Machine Works

Pumps (Centrifugal)
Allis-Chalmers Mfg. Co.
Erie Pump and Engine Works
Georgia Iron Works
Morris Machine Works

Pumps (Dredging)
Allis-Chalmers Mfg. Co.
Erie Pump and Engine Works
Georgia Iron Works
Morris Machine Works

Pumps (Sand and Gravel)
Allis-Chalmers Mfg. Co.
Erie Pump and Engine Works
Georgia Iron Works
Morris Machine Works

Purifiers, Steam (See Steam Purifiers)

Respirators
Pulmosan Safety Equipment Co.

Rock Drills (See Drills—Rock)

Rod Mills
Kennedy-Van Saun Mfg. and Eng. Corp.

Roller Bearings
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Rope (Wire) (See Wire Rope)

Safety Equipment
Pulmosan Safety Equipment Co.

Sand Separators
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan and Stone Corp.
Smith Engineering Works

Sand-Settling Tanks
Jeffrey Mfg. Co.
Link-Belt Co.
Smith Engineering Works

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Link-Belt Co.
Sauerman Bros., Inc.

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Chicago Perforating Co.
Deister Machine Co.
Eagle Iron Works
Gay, Rubert M.
Haiss Mfg. Co., Geo.
Hendrick Mfg. Co.
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McLanahan and Stone Corp.
Morrow Mfg. Co.
National Wire Cloth Co.
Productive Equipment Corp.
Robins Conveying Belt Co.
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Sprout, Waldron & Co.
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Austin-Western Road Mchy. Co.
Barber-Greene Co.
Deister Machine Co.
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Steel Inclines (See Inclines, Steel)

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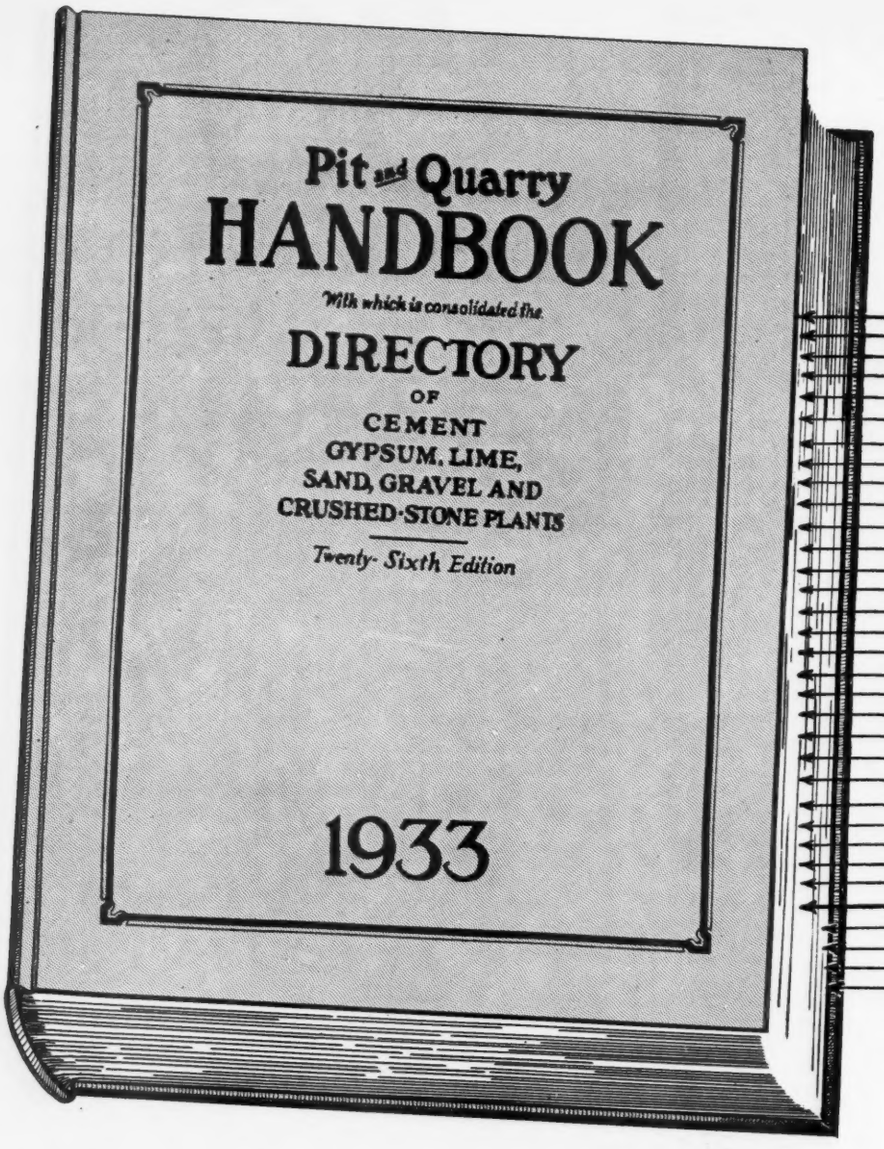

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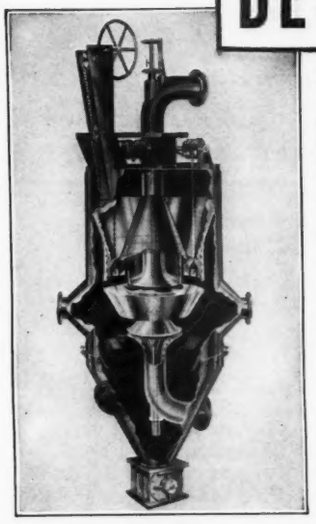

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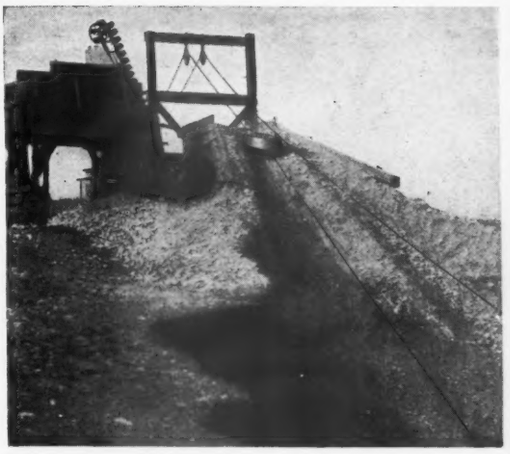

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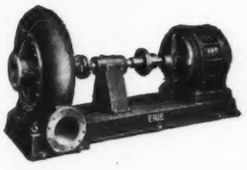

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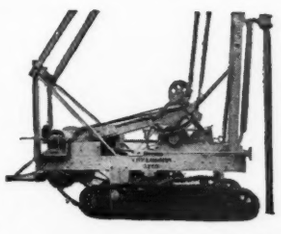

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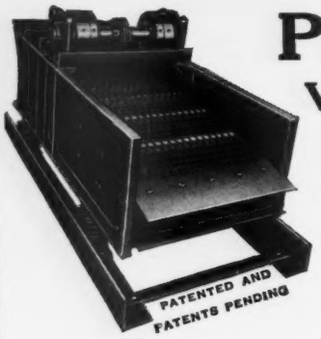

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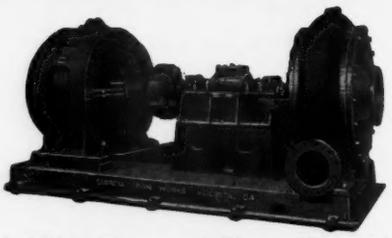

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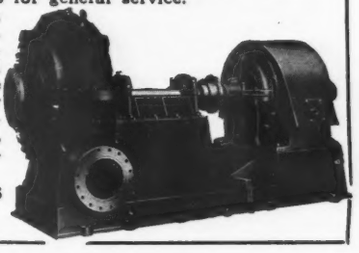

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1-300	Al. Ch.	2200	Slip Ring	585
1-275	G. E.	550	Synch.	900
2-200	G. E.	2200/440	Synch.	514
1-200	Wsthse.	440	Slip Ring	500
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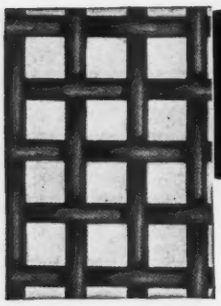

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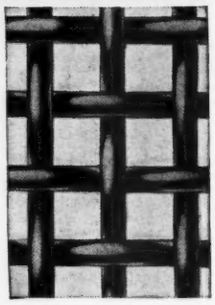

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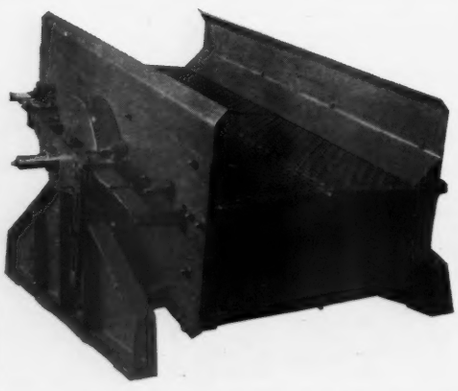
Williamsport Wire Rope Co. .. 10

***See also information in the 1933 Pit and Quarry HANDBOOK**



ROBINS GYREX SCREEN

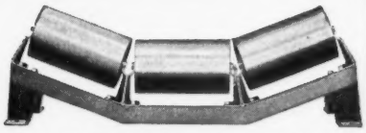
is a money-saver for the operator. With its time-tested reliability, proven-principle of action, long-lasting GYRALOY wire mesh the GYREX solves the producer's present problem.

ROBINS BELT CONVEYORS for everlasting service.
ROBINS VIBREX Screens for fine sizing.

ROBINS CONVEYING BELT CO.
15 Park Row, New York
Old Colony Bldg., Chicago
Boston—Charleston, W. Va.—Cleveland
Detroit—Philadelphia—Pittsburgh

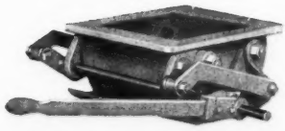
MATERIAL HANDLING ROBINS EQUIPMENT

Agents in other principal cities



Type 101 Timken Belt Conveyor Idler: A Grease Tight, Dust Proof, rugged power saving unit for trouble free service.

Bucket Elevators: All sizes and types designed, engineered and built to meet all kinds of service.



Gates: Bin Gates, Chutes, Spouts in a variety of sizes and types.

MONARCH
TRADE NAME

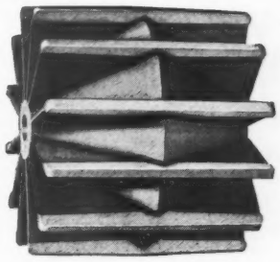
Material Handling Equipment

Monarch Belt Conveyors Idlers, Bucket Elevators

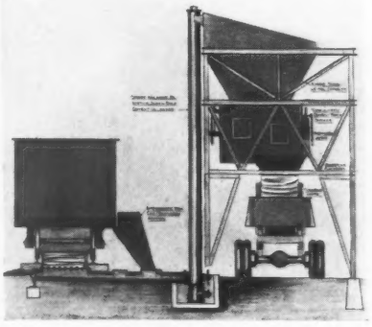
as Built by Sprout, Waldron & Co. is cutting handling and upkeep costs in hundreds of plants. Our Modern Line of Timken Belt Conveyor Idlers, Bucket Elevators, Bulk Cement Handling Elevators and Batch Checkers for temporary and permanent plants is acknowledged to be most rugged in construction, economical to operate and reasonably priced.

We solicit an opportunity to submit an estimate on equipment you are considering.

Sprout Waldron & Co.
1221 Sherman St., Muncy, Pa.



Wing Pulley: A belt saving Tail Pulley for Elevators and Belt Conveyors, prevents stones getting under belt to cause damage.



Bulk Cement Handling Units: Dust Proof, weather tight, Vertical Screw Elevators meet road contractors requirements for an economical and profitable unit to handle Bulk Cement profitably.

the Barber-Greene Portable SCREENING & CRUSHING Plant for obtaining Sand and Gravel from Local Sources RAPIDLY—CHEAPLY

EVEN though you are a large producer, and have ample facilities for handling all of your anticipated demands, you should investigate the NEW business possible with the Barber-Greene Portable Screening and Crushing Plant.

Regardless of how cheaply you can produce gravel, you will not be able to get in on the secondary road gravel business if there are excessive hauling costs.

With the B-G Plant, you not only produce material rapidly and cheaply—but you produce from local sources, reducing hauling costs to the minimum.

The plant consists of a Barber-Greene Model 62 Self-Feeding Bucket Loader with a double deck vibrating screen, and a Barber-Greene crawler mounted crushing unit. The Crusher is towed by the Loader.

The machine works right into the bank or stock pile. One operator easily controls the entire plant. Where the bank is partially cemented a helper can increase the capacity by loosening the material. The units may be operated independently if desired.

NOTE TO CONTRACTORS: This machine is ideal for rejuvenating old gravel roads. The road material is windrowed and the Barber-Greene Plant travels down the road under its own power, crushing the oversize, removing the percentage of fines desired, and discharging the sized material into a windrow in the rear.

Complete information upon request. No obligation.

BARBER GREENE
492 W. Park Ave.,
Aurora, Illinois

BAY CITY MODEL 30

STANDARD HALF YARD

NEVER before have SPEED—POWER—and MOBILITY been combined in a revolving shovel with the fine degree of balanced design now available in BAY CITY MODEL 30. Elimination of much useless "dead" weight through compact design and liberal use of tough alloy steels and heat treated gears provides a combination of handy, economical weight, with speed, power, endurance and the well known Bay City mobility and ease of steering—unequalled by any other shovel or crane.

Model 30 has plenty of that—"what-it-takes"—to make not just a good shovel, but an outstanding shovel and the best value obtainable per dollar.

All of the refinements, quality, patented features and desirable functions of the larger heavy-duty three quarter and one yard Bay Citys, time tested and proven, are reproduced in Model 30.

Model 30—with economical handy weight, and a rare combination of speed, power and built-in endurance offers *all* the following quality construction usually reserved for heavy high priced machines, and *available on no other machine in Model 30* price and weight class.

LET THE SPECIFICATIONS SPEAK FOR THEMSELVES

Convenient economical weight—15 ton.
Helical cut gears—noiseless.
Unit (Hi-manganese) car body and machinery table.
Frictionless bearings thruout.
4 or 6 cylinder power.
Extra large diameter swing roller-path.
Oversized clutches and brakes.
Drop forged crawler shoes.
Long crawlers—low bearing pressure.
Chain crowd with automatic adjustment.
Swing lock—in any cab position.
Automatic Travel lock.
Extra heavy cab. Plenty inside working room.

THE ONLY HALF YARD
With Helical Cut Gears and Frictionless Bearings Throughout

8 Other Sizes
3/8 to 1¼ Yd.
3 to 18 Ton Crane Capacity

Cut Costs With Modern Equipment

BAY-CITY SHOVELS

General Office and Factory
BAY CITY, MICHIGAN
Eastern Office and Warehouse, Roselle Park, N. J.